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THE
MICROSCOPIC JOURNAL,
AND
STRUCTURAL RECORD
FOR
1841.

WITH FORTY ILLUSTRATIVE DIAGRAMS, BY JOSEPH DINKEL.

EDITED BY
DANIEL COOPER,

MEMBER OF THE COLLEGE OF SURGEONS, LONDON; ASSOCIATE OF THE LINNÆAN SOCIETY;
MEMBER OF THE MICROSCOPICAL SOCIETY OF LONDON; AUTHOR OF
"THE FLORA METROPOLITANA," ETC., ETC.

LATE
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Biology

TO

JOHN EDWARD GRAY, Esq.,

F.R.S., F.G.S., M.R.G.S.,

PRESIDENT OF THE BOTANICAL SOCIETY OF LONDON,
KEEPER OF THE ZOOLOGICAL COLLECTION OF THE BRITISH MUSEUM,
ETC., ETC.,

The following Pages

ARE MOST RESPECTFULLY INSCRIBED,

AS A HUMBLE THOUGH GRATEFUL ACKNOWLEDGMENT FOR MANY ACTS OF
FRIENDSHIP AND KINDNESS RECEIVED AT HIS HANDS AND IN
CONSIDERATION ALSO OF HIS HIGH ATTAINMENTS
AS A NATURALIST,

BY HIS LATE ASSISTANT IN THE BRITISH MUSEUM,

THE EDITOR.

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THE

MICROSCOPIC JOURNAL.

I.—A BRIEF SKETCH OF THE RISE AND PROGRESS OF MICROSCOPIC SCIENCE, AND THE PRINCIPAL MEANS ENUMERATED WHICH HAVE TENDED TO ITS GENERAL ADVANCEMENT.—BY THE EDITOR.

As MICROSCOPIC research is for the most part an amusement rather than a profession, it cannot be a matter of surprise that many resort to it as a means of intellectual pastime, which is sure to terminate in beneficial results.

General knowledge may be acquired by observation—recondite science by application alone—and the existence of the former in the mind of the apparent tyro, by industry and perseverance imperceptibly produces the latter. How many are there who recur with delight to the growing taste which has slowly but sensibly advanced with the years, months, or days, they have devoted to the examination of the minutiae of nature. How many are there, who, deprived of the enjoyment of health, and whose lives have been devoted amidst anxiety and fatigue to the pursuits of science, find in their retirement a never failing source of amusement and instruction in the microscope; and who discover within their threshold, at every season, objects for contemplation in the vast sphere of nature, the examination of which tends to ameliorate the disposition, strengthen the comprehension by the rational exercise of the mind, and render visible, even in the most inconspicuous of objects, evidences of an Omnipotent Artificer. But, to be brief—let us now consider, at a general glance, the rise and progress of microscopic science in England, within the last fifteen years, by stating the principal and very gradual means by which the taste at present existing has been so effectually established.

At the instigation of Dr. Goring in the years 1824 and 1825, TULLEY constructed the first achromatic objectives made in this country, and termed by him the “triple object glasses.” Every merit is due to these gentlemen for their exertions in thus improving and laying the foundation for opticians to work upon, who, unacquainted with what the continental opticians were doing, brought before the public the result of their labours much about the same time as SELLIGUE in France, FRAUNHOFER of Munich, and AMICI of Modena.

In the Philosophical Transactions for 1830, Vol. 120, p. 187, will be found an elaborate paper by Mr. Joseph Jackson Lister, "On some properties in achromatic object glasses, applicable to the improvement of the microscope," in which he gives "the formulæ for working object glasses of short foci and large aperture, with a view to increase the power and the ease of manufacture." It must on all sides be admitted that these researches of Mr. Lister worked a great change in the microscope, and have since they were promulgated, formed the basis on which opticians of late years have worked,—rendering it the most eventful era in modern microscopic improvement. The interest and anxiety this unpretending philosopher has, up to the present time, evinced in supervising and assisting those whose lives have been devoted to the subject, and who now rank as the first manipulators of the age, merits on all sides the greatest praise.

The first and most important attempt to develope to the public gaze the microscope on a large scale, was made by Mr. Carpenter, of Regent street, who for many years exhibited a solar microscope, for the gratification of the public. The uncertainty, however, of the weather, and state of atmosphere generally, in this country, and more especially in the metropolis, was the great obstacle to this exhibition. This difficulty, at first sight insurmountable, was at length overcome by Mr. J. T. Cooper, who had for many years applied for private purposes, the oxy-hydrogen gases projected on lime, (known generally as the oxy-hydrogen light) as a means of illustrating in his laboratory and lectures, many of the important facts connected with light.

At a meeting of a few scientific friends to witness the results of some experiments with this light, at Mr. Cooper's laboratory, then at the Aldersgate street School of Medicine (twelve years since) Mr. Cooper and Mr. John Carey, of the Strand, feeling assured of the principle and stability of the application, proposed to apply this substitute for the solar rays to the illustration of microscopic power, and accordingly arrangements were made, and a microscope constructed, adapted expressly to the peculiar nature of the light, which, as is well known, differs in many respects from that received from the sun. The first microscope (an experimental one) was opened in the Strand in the year 1832, nearly opposite the end of Norfolk-street ; this spot was selected on account of the contiguity to Mr. Carey's workshops, as a matter of convenience only. When by dint of much time and experimental application, Messrs. Cooper and Carey had accomplished their labours to their satisfaction, the scientific public it will be remembered, were invited to attend at 21, Old Bond-street, on 18th of February, 1833, to witness

the first public exhibition of the kind ever presented, in which the oxy-hydrogen light was made to perform all that had been hitherto effected with direct solar light; and it is but justice to those gentlemen to affirm, that this exhibition was considered to be, both by scientific men and the public at large, not only most creditable to the labours of the projectors, but the most interesting and important that had ever been offered to the public, and which could not fail to attract the attention of persons in every age, rank, and station in life; — but possessing the noble aim of enlarging the views of the multitude, by drawing their attention to the wonderful and beautiful adaptations of nature to secure her end. No exhibition was for a period better attended than was this; others in the course of a short time sprang up in various parts of the metropolis and the provinces, and two are even daily exhibited at the galleries of Practical Science in London, forming the leading attraction, and exciting the general interest and amusement of those who visit these institutions.

We have dwelt rather longer on this part of our subject, than it was our intention to do. We shall at all times be advocates for giving "*merit where it is due*," and as we do not find a representation of the above facts in a work recently published, expressly on the subject of the "Oxy-hydrogen Microscope" by a Philosophical Instrument Maker, we have considered it but fair to place them on record.

The application then of the hydro-oxygen light to microscopic purposes, by Messrs. Cooper and Carey in the place of the very uncertain means (solar light) by Mr. Carpenter, created at this period a *very general* taste for microscopic science. But, although the subject was thus treated on a very extensive scale by such exhibitions, the minutiae had long before, and were even then, daily attracting the attention of the scientific world, especially of Robert Brown, F. Bauer, R. H. Solly, Lister, Cuthbert, Pritchard, Goring, and a host of others.

But it must on all sides be agreed, that every praise and commendation the world can bestow, are due to the indefatigable exertions of Mr. Bowerbank, who by his well known liberality in promoting the cause, has at length succeeded in diffusing that growing taste for microscopic research in the metropolis, characteristic of the present age. To this gentleman's liberality, in opening his house weekly, for the purposes of microscopic illustration, is in a great measure to be attributed the first dawn of encouragement to the rising scientific generation. Ever ready, ever desirous, and ever interested in the tyro's cause, he must have created in the minds of those, seeking such valuable aids, every regard and esteem: and especially when we consider that the

limited means of investigators formerly, and even at the present day, have not allowed them such splendid instruments and practical facilities in the manipulation which the fortune and talents of Mr. Bowerbank, enable him so amiably and freely to dispense to those who seek his advice and experience.

The competition which microscopic investigators have succeeded incessantly in keeping up for years between Mr. Powell and Mr. Ross (and to whose names must now with all credit be added, that of Mr. Smith) has materially tended to the advancement of microscopic science; it has had the beneficial effect of developing a taste for competition between the parties, and of rousing the hitherto dormant spirit of opticians to vie one with the other, and the results which have been, and are daily manifesting themselves at their hands, are of the most important and satisfactory nature.

All these considerations and facts combined have ultimately led to the establishment of the "Microscopical Society of London." A society, having so distinguished a President, whose name and fame as an explorer of nature is too well known to require comment here, and supported as it is by names which may be reckoned "Ornaments to the nation," there cannot be a doubt that this Society will work great benefits to science in all its branches.

II.—ON THE STRUCTURE OF FOSSIL TEETH FROM THE CENTRAL OR CORN-STONE DIVISION OF THE OLD RED SAND-STONE, INDICATIVE OF A NEW GENUS OF FISHES, OR FISH-LIKE BATRACHIA, FOR WHICH IS PROPOSED THE NAME OF DENDRODUS.*

By Richard Owen, Esq. F.R.S., President of the Microscopical Society, &c., &c.

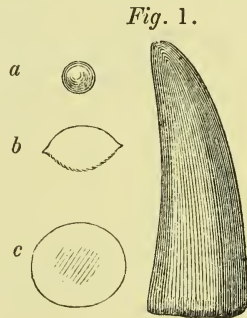
THE fossil remains, which form the subject of the present paper, consist of three detached teeth, which were transmitted to me by Dr. Malcolmson. They were found in the quarry of Scat-crag, near Elgin, which belongs to the central, or Corn-stone division of the Old Red Sand-stone.

These teeth present no very remarkable peculiarities of external form; although each had sufficiently distinctive characters of its own, they

* Read at the Microscopical Society of London, Feb. 17, 1841, and communicated by the Author.

differed also from one another in size as well as form. The first and largest specimen, (*Fig. 1.*) which measures one inch and a half in length, and half an inch across the base, resembles the teeth of the crocodilian reptiles in general form, but differs in being solid; presenting a very slight excavation at the base. It is conical, rounded at the base (*a*), but becoming subcompressed in the crown (*b*), slightly bent, and gradually diminishing to an obtuse rounded apex (*c*): in this respect resembling certain of the teeth of the *Labyrinthodon*; it resembles the teeth of this family of extinct Batrachia still more essentially in being impressed with numerous fine equi-distant longitudinal striæ, about half a line or rather less, apart; but it is also traversed by two opposite longitudinal ridges; the surface of the tooth is otherwise smooth. From the roughness of its base, the margin of which is rounded in, I suspect that the tooth was originally anchylosed to the base of a shallow socket, as in the *Labyrinthodon* and in certain fishes, as *Dyctyodus* and *Sphyræna*. The absence of any remains of Vertebrate animals, higher than the class of fishes, from the Old Red Sand-stone system, and the remarkably characteristic structure of the teeth of certain low-organized reptiles from the New Red Sand-stone; viz., those of the genus *Labyrinthodon*, led me to resort without delay to the microscopic test, in order to gain further insight into the nature and affinities of the ancient Vertebrata indicated by the scanty organic remains alluded to at the beginning of this paper. I commenced, therefore, by having prepared two transverse sections of the tooth just described, which I propose to indicate by the name of *Dendrodus biporcatus*.* The annexed cut exhibits the tooth of its natural size. The section taken from near the base of the tooth was examined, by transmitted light, under an inch objective of Ross's Compound Achromatic Microscope.

Thus magnified, a central pulp-cavity of relatively small size, and of an irregularly lobulated form is discerned, a portion of which is shown at (*Fig. 2, a*); is immediately surrounded by the transverse sections of large cylindrical medullary or pulp-canals of different sizes; and beyond these there are



* This name is given in reference to the opposite ridges by which the tooth is characterized.

smaller and more numerous medullary canals. These are processes of the central pulp-cavity; viewed in the transverse section they are connected together by a net-work of medullary canals, belonging to a coarse osseous texture, and this structure occupies the middle half of the section. All the above cavities were filled by the opaque matrix.

Fig. 2.



Nat. Size.

a

From the circumference of the central net-work straight medullary canals radiate at pretty regular intervals to the periphery of the tooth, most of these canals divide once, rarely twice, in their course; the division taking place sometimes at their origin, in others at different distances from their termination; and the branches diverging slightly as they proceed. Each of the above medullary rays is continued from a short process of the reticular structure, which is connected by a concave line with the adjoining process, so that the whole periphery

of the transverse section of the central coarse reticular medullary body of the tooth presents a crenate outline, and sends off at brief intervals, through its whole course, short branches slightly inclined towards the periphery of the tooth. Throughout the whole extent of each ray and its primary dichotomous divisions, short branches are sent off at brief intervals, generally at right angles with the trunk, or slightly inclined towards the periphery of the tooth. These subdivide into a few short ramifications, like the branches of a shrub, and terminate in irregular and somewhat angular dilatations, simulating leaves, but which resolve themselves into radiating fasciculi of calcigerous tubes. There are from fifteen to twenty-five or thirty-six of these short lateral branches on each side of the medullary rays.

In a section of the same tooth, one third from its obtuse summit, the irregular central pulp-cavity was lost, and in its place there were a few large medullary canals connected by a fine net-work of smaller canals. This tissue occupied rather more than one third of the diameter of the section. From its periphery there was continued the same system of nearly straight, sparingly dichotomizing medullary canals, radiating at regular distances from the central tissue to the periphery of the tooth. The radiating canals here also give off short

lateral branches, but these do not terminate in such well-marked dilations as those observable at the base of the tooth. The transverse branches are generally given off from short alternate lateral bendings of the main stem. There are about forty radiating medullary canals in this part of the section, and about fifty in the section taken from the base of the tooth.

At this part the angular dilated terminations of the small lateral branches form, as has been said, the centres of radiation of a system of the most minute calcigerous tubes, each system constituting a lobe of the dentine, separated from the adjoining lobes by an extremely thin layer of cement. In the section nearer the apex of the tooth, the radiating systems of calcigerous tubes, forming similar lobes of dentine, are given off more from the sides of the lateral branches than from their terminal dilatations. The peripheral extremities of the medullary rays, and of such of their subdivisions or branches as are nearest to and directed towards the margin of the section, and consequently to the periphery of the tooth, are resolved into fasciculi of calcigerous tubes, which diverge in graceful curves from their point of origin. The central tubes are continued from the interspace of the diverging ones to the periphery of the tooth, in a line parallel with that of the main medullary canal which radiates from the central reticulation; the other tubes gradually diverge more and more from this line, and those which proceed from the sides of the extremity of the medullary canal run at right angles to its course. The lateral tubes terminate, together with those of the adjoining medullary canal, in a linear series of calcigerous cells; which line is continued inwards from the periphery of the tooth, like a process of the external capsule, inclosing and defining, as it were, each of these terminal square lobes or systems of calcigerous tubes; there is a slight indentation of the periphery of the transverse section at the line of the above described inflection of the cellular structure; and this indentation is a section of one of the fine superficial longitudinal striæ, already mentioned. The inflected line of minute cells may be traced, in each case, to near the central reticulated system of medullary canals, sending off branches on each side, which bound in a similar manner the different lobes of dentine or systems of radiated calcigerous tubes which are given off from the sides of the straight medullary canals. The external longitudinal fine grooves on the superficies of the tooth indicate, as above mentioned, the entering lines of the fine cellular cement, or the interspaces of the lobes of dentine appended to the medullary canals which radiate from the central pulp-cavity or net-work. The medullary rays, though, for the convenience of description they have been termed

canals, as they appear to be in the transverse section of the tooth, yet are probably not cylindrical tubes. For it must be obvious from the similarity of the appearances of the two sections here alluded to from nearly the two opposite extremities of the tooth, that the radiating lines, described as medullary canals are, more probably, sections of vertical fissures, or lamelliform processes of the pulp, radiating from the central body of the pulp and co-equal with the longitudinal extent of the tooth; but decreasing in number as the tooth contracts towards its apex.

[To be continued at page 17, and concluded.]

III.—ON THE KERATOSE OR HORNY SPONGES OF COMMERCE.*

By J. S. Bowerbank, Esq. F.G.S., &c.

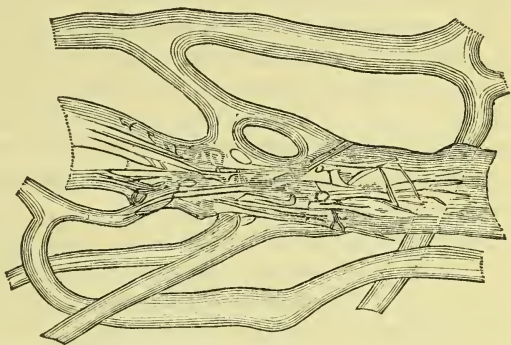
AT the commencement of the communication, Mr. Bowerbank alluded to the valuable researches of Dr. Grant,† in which he has not only detailed the general forms and structure of the various tribes of sponges, but traced their animal nature, which he has proved beyond all doubt by investigating their mode of propagation. The conclusions arrived at by Dr. Grant are that these *Poriferous* animals are composed of a minute reticulated tissue, which derives its support from a thread whose structure is either horny or cartilaginous, hence called *Keratose*; or from the dispersion through its substance of numerous *silicious* or *calcareous* spicula. The generic differences are established according to which of these structures prevail. Mr. B. alluded to those termed *Keratose* described as being composed of *tubular* fibres and *destitute* of spicula; these embrace the Sponges of Commerce, &c.

Dr. Grant's observations were limited principally to the British species of sponge having *siliceous* or *calcareous* spicula: the true Horny (*Keratose*) species not having up to that period been found on our coast. Sowerby in his "British Miscellany" has subsequently figured the *Spongia pulchella* obtained from the southern and western coasts of England. Mr. B. then gives Dr. Fleming's description of the genus *Spongia*—"Porous, the cartilaginous skeleton simple, or destitute of earthy spicula;" characters which will be presently shown from the investigations and researches of Mr. B. to be of little or no importance. The author was led to investigate this subject on account of having had a very extensive collection of sponges (amounting to forty species) presented

* (Abstracted from the Paper read before the Microscopical Society of London, January 27, 1841.)

† New Edinburgh Philosophical Journal, 1827.

to him by Rupert Kirk, Esq. obtained from Sydney, Australia. Many of these specimens had all the appearance of being true *Keratose* species, but which were afterwards, on examining them with a power of three hundred *linear*, found to possess these bodies imbedded, to a greater or less extent, in the substance of the fibre as represented in the annexed diagram;* they are not always to be found, at first sight, and in some cases not until a patient search has been made. In some instances it is even requisite to burn



some quantity before the blow-pipe, and to subject the ash to the action of dilute muriatic acid, previous to examining the residue.

The results obtained from the examination of the Australian species, led Mr. Bowerbank to investigate the *Keratose* Sponges of Commerce, which he obtained previous to their being prepared as is customary by bleaching and cleaning.

In commerce two kinds of sponges occur:—the *Turkey*, which is of the finest texture, and obtained from the Mediterranean, two species of which Mr. B. makes out; and the *West Indian*, the source of which is principally the Bahama Islands, and consists of one species only.

The division of the *Turkey* sponge is not ascertained until carefully examined by the microscope. The ordinary prepared sponge of commerce (*Spongia Officinalis*, *Lam.*) exhibits a smooth light amber-coloured fibre, but if the specimen be examined in its natural state, it will often be found to be coated with a rugous film, containing minute granulations, the entire object being of a darker colour than in the previous instance. Mr. B. considers these granulations to be the incipient gemmules of the sponge, and there appears every probability for this conjecture. Dr. Grant has minutely examined and described the gemmules in numerous British species of *Halichondria*.

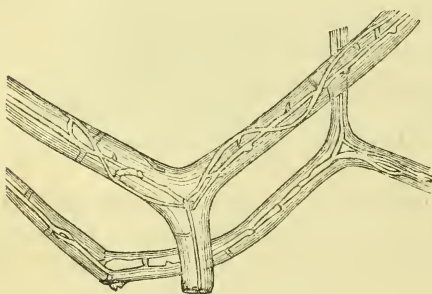
The spicula are mostly to be observed in the sponges of commerce, in the larger flattened portions of the fibre, and not in the finer

* The drawings represent pieces of the two species of Mediterranean sponges, and not Australian sponges.

anastomosing transparent threads which are of various sizes—this occurrence is seen in the foregoing diagram—the number of spicula is by no means constant. They assume various forms, and are possessed of a central cavity lined with membranes.

The solid nature of the fibre of the Keratose sponges is best observed with a Lieberkuhn, and a power of about five hundred linear; and the plan Mr. B. adopts as a convenient and satisfactory mode of preparing the object is to take a piece of sponge, and tie it tightly round with thread, so as to approximate the fibres and form a dense mass, and then by cutting it with a sharp knife at right angles to the axis. The cut extremities of the fibres when examined as an opaque object exhibit no internal cavity, they are solid throughout, and water produces no change in their appearance.

The second species of Turkey sponge cannot be distinguished from the common one without the aid of high magnifying power, (five hundred linear) its form and general characters agreeing so much with it. It is, however, at once to be recognized by a beautiful, branched *vascular*



tissue of various dimensions, which surrounds in great abundance nearly every fibre of its structure, (as seen in the diagram) many of the ramifications of which terminate in *Cæca*. Mr. Bowerbank has ascertained that these vessels are not imbedded in the substance of the fibre itself; but, are enclosed in

an external membrane or sheath, covering the solid fibre.

In some of the vessels Mr. B. observed numerous small globules, somewhat analogous to those of the blood of the higher animals of a circular form, and varying in diameter from the $\frac{1}{16.666}$ th to the $\frac{1}{50.000}$ th of an inch. The mean diameter of the vessel was the $\frac{1}{9.346}$ th of an inch, and the diameter of the fibre on which the vessel anastomosed measured $\frac{1}{5.88}$ th of an inch. This structure is not confined to the Turkey species, but has also been observed by the author on many of the Australian sponges.

The only true tubular recent sponge known to Mr. B. is the *Spongia fistularis* as described by Dr. Grant, specimens of which he has satisfactorily examined, and which he proposes to separate from this group, and has suggested the generic name of *Fistularia*. This separation is

considered by the author to be the more necessary as tubular species are not uncommon among fossil sponges.

Mr. B. also made some observations on the nature and structure of the *spicula*. He cannot reconcile himself to the description given by Dr. Grant: viz. "they appear to be tubular like many natural crystals," as he is not aware of the existence of true cylinders in crystalline bodies, such as the silicious and calcareous sponges present. Neither can he agree with Professor Rymer Jones on the identity of these with the *raphides* or crystals formed in the cells of plants; these bodies are solid, and in no case cylindrical, they are mere adventitious bodies in the vegetable kingdom; and cannot, therefore, be compared with the *spicula* which occur in sponges, forming a portion of the organization of the animal. The normal form of either kinds of *spicula* Mr. B. considers to be always the same, another proof of their animal deposit; and is inclined to consider with Dr. Grant that, "they are formed from materials due to the vital energies of the animals, and form normal and necessary parts of its structure, like the solid skeletons of higher animals."*

OBSERVATIONS ON MICROSCOPIC MEASUREMENT.†

By George Jackson, Esq., Surgeon, &c.

ALTHOUGH I have nothing new to communicate, I am induced to offer a few observations on this subject from having known many persons in possession of good instruments, who are not aware of the very simple means by which they can obtain accurate measurements of the objects of their research.

When single Microscopes were the only ones capable of being employed in scientific investigation, the micrometer consisted of a slip of glass ruled with fine divisions, varying from $\frac{1}{100}$ th to $\frac{1}{1000}$ th of an inch. On this the object was laid, and an attempt was made to see it and the lines at the same time.

Except when using a low power, or in the case of a very thin object, this could scarcely be accomplished; and if the bodies to be measured were immersed in a fluid as is generally the case, the lines on the glass were totally invisible. It was also inapplicable to opaque objects, and even to transparent ones after they were mounted.

The perfection to which compound microscopes have been brought

* Outlines of Comparative Anatomy.

† Read at the Microscopical Society of London, September 23, 1840.

has afforded the opportunity of applying to them the different micrometers used with telescopes. The best of these is the wire micrometer. It consists of two parallel cobwebs, stretched across the field in the focus of the eye-piece, which can be separated by a fine screw, the head of which is divided into one hundred equal parts. The side of the field, which is a parallelogram, is also indented with notches made by the threads of the same screw, so that the number of turns can be read off in the field of the instrument, and the fraction of a turn on the divided head. The mode of using it is as follows :—Place a glass micrometer on the stage, and separate the wires by the screw until they exactly coincide with two of the divisions, when the number of turns, and decimal parts of a turn equivalent to the space included between the divisions will be the data from which the value of the screw may be calculated. Suppose for example, that it requires 3.65 turns to separate the wires in the eye-piece, so as to make them coincide with the divisions of the thousandth of an inch in the stage, the value of each division on the screw-head will then be $\frac{1}{365,000}$ th of an inch. This instrument when well made is rather expensive, and requires some care in using ; and as its accuracy is founded entirely on that of the glass micrometer used in finding its value, measurements made by it are by no means so delicate as they appear to be.

A more simple method of ascertaining the dimensions of a minute object, is to substitute for the wires and screw, a piece of glass divided by lines, with every fifth cut either longer or deeper, so as to be readily counted. This may be set in a cell and dropped on to the stop in the ordinary negative eye-piece, and the value of the divisions found in the manner before mentioned. It should be observed, that in using either this or the wire micrometer, a fractional value inconvenient in practice may be avoided by lengthening the body of the microscope by means of a draw-tube, until the divisions on the stage coincide with some convenient decimal number. When this process has been gone through with each object glass, a table should be written containing the value of the divisions, and the length of the tube drawn out ; so that measurements may be made by any of the object-glasses without the trouble of constantly appealing to the micrometer on the stage.

A mode of applying the stage micrometer *directly* to the measurement of small bodies has been long used by J. J. Lister, Esq., with whose permission I describe it. Place the microscope horizontally, and with the Camera-lucida sketch the outline of the body to be measured ; then remove the object from the stage, and substitute the divided glass in its place, throwing the image of it by the Camera over the sketched out-

line. In this way a very accurate measurement may be made, for it is evident that the object and the micrometer are viewed with precisely the same magnifying power; and if the drawing is intended to be preserved, a sketch of the micrometer may be made on the margin, which may be used as the scale generally attached to a map or plan. This plan may be modified by sketching the micrometer with each object-glass and eye-piece, laying these sketches under the prism of the Camera-lucida, and throwing the image of the object at once on them. If these sketches be made with the eye exactly ten inches from the paper, by comparison with a rule divided into inches and tenths, they will give the magnifying power of the instrument more accurately than the ordinary mode.

In using the Camera-lucida some eyes require a lens, either convex or concave, placed beneath the prism to enable them to see the point of the pencil clearly. This, by magnifying or diminishing the apparent size of the paper, diminishes or magnifies the relative size of the drawing made on it, and therefore must not be used in taking the power of the instrument; but in measuring bodies on the stage, it is of no importance, as the micrometer and object are both equally affected by it, and consequently their relative sizes remain the same.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

January 27th, 1841.—*Richard Owen, Esq. F.R.S. President, in the Chair.*

Mr. George Whipple was elected a member; and Messrs. Joseph Jackson Lister, and Wm. Greening were elected auditors, to examine and report upon the state of the accounts at the Anniversary Meeting.

Mr. Owen exhibited specimens of the teeth of the *Labyrinthodon*, described by him at the last meeting of the Geological Society; and explained the peculiarities of the dental structure, in that extinct genus of reptiles.

Mr. C. Varley stated that he had brought to the Society a new form of microscope, in which he had introduced some improvements upon his former mode of effecting the stage movements, with a view to facilitate the examination of minute living animalcules by enabling the observer to keep them within the field of vision under their most rapid movements.*

Mr. J. S. Bowerbank read a paper "On the Keratose, or Horny Sponges of Commerce," a full abstract of which will be found at page 8.

The meeting then resolved into the usual conversazione.

* It is Mr. Varley's intention to lay this improvement before the Society of Arts; it will be inserted as soon as made known.—ED.

February 15th 1841.—Anniversary Meeting. The President in the Chair.

The Council reported, that the number of members now amounts to 177. That the constitution and by-laws of the Society had been determined on and printed, together with a list of the members, and that these had been distributed among the members. The Council having also determined to reprint the list annually. The number of papers and communications, on subjects connected with microscopic research which had been read at the ordinary meetings of the Society amounted to 18. The MSS. of these papers had all been presented to the Society by the respective authors, together with a portion of the drawings, diagrams, and specimens, by which they had been illustrated.

Several contributions to the Library and Microscopic Cabinet were alluded to as having been received.

The auditor's report was then read, from which it appeared that the receipts of the Society, since its commencement in January 1840, amounted to £354 18s. consisting of the admission fees, and annual and life subscriptions; that of this sum £64 2s. 9d. had been expended for the various purposes of the Society, leaving a balance of £290 15s. 3d. of which there were in the Treasurer's hands £40 15s. 3d. and at the bankers' £250.

The President then read the Annual Address from the Chair. After alluding to the circumstances in which the Society had originated, he congratulated the members upon the degree of prosperity which it had in so short a time attained, and which had exceeded the most sanguine expectations of its original projectors, and then proceeded at considerable length to review the labours of the past year, and the contributions which had been made to Microscopic Science in reference to Minute Anatomy, Animal and Vegetable Physiology, Zoology, and Palæontology; as well as the attempts which had been made to improve the microscope itself as an instrument of scientific research; and he concluded by deploring the loss, by death, of two distinguished members, Dr. Todd of Brighton, and Mr. Field, Surgeon to the Charterhouse, and Chairman of the Society of Apothecaries in London. Upon the former of whom he pronounced a high eulogium, which was called forth by the almost unexampled ardour of that individual in the pursuit of anatomical and physiological science, and in the collection of specimens illustrative of obscure or debateable points in physiology and pathology, of which valuable collection it was announced that the greater part had been purchased by the Royal College of Surgeons in London, for the purpose of being placed in their museum.

At the conclusion of the Address, it was proposed by Mr. Solly, and seconded by Mr. Bowerbank, and carried unanimously, that with the President's permission the Address be printed and distributed among the members, and the Address was ordered to be printed accordingly.

The meeting then proceeded to elect by ballot the officers and members of Council for the ensuing year. The following gentlemen

were then elected :—Richard Owen, Esq. *President* ; N. B. Ward, Esq. *Treasurer* ; and Dr. Arthur Farre, *Secretary*.

The four following gentlemen were then elected Members of the Council, viz. J. G. Children, Esq., J. E. Gray, Esq., John Dalrymple, Esq., Henry Reynolds, Esq., in room of the four following who retire : Dr. Frederic Farre, Dr. Lindley, Rev. Charles Pritchard, and M. J. Rippingham, Esq.

February 17.—The President in the Chair.

Professor Ehrenberg and Professor Purkinje of Breslau were elected Honorary Members, and Mr. Daniel Cooper, an Ordinary Member.

Mr. Richard Owen having vacated the Chair (which was taken by the Treasurer, Mr. N. B. Ward), he proceeded to read his paper, accompanied by drawings and specimens, "On the structure of fossil teeth from the central or corn-stone division of the old red sand-stone, indicative of a new genus of fishes, or fish-like Batrachia, for which is proposed the name of *Dendrodus*." The first part of this paper will be found at page 5 in the present number.

In the absence of discussion the Meeting adjourned until March 17th, and the usual conversazione, and examination of objects commenced.

Microscopical Memoranda

A New reflecting Microscope.—Mr. Guthrie modifies Amici's Microscope, by removing altogether the plane speculum, and placing the object to be viewed in the axis of the tube. This arrangement is to the microscope, what Sir W. Herschel's is to the reflecting telescope. In order that the object may be properly illuminated, the part of the tube next the mirror is wholly removed, and three pillars substituted for it, to one of which the stage for the object is attached, and regulated by an adjusting screw.—*Jameson's Journal*, No. 44.

On the Existence of Infusoria in Plants.—Røper has shown, that the cells of *Sphagnum obtusifolium* (Bog-moss), contain little openings into which the animalcule, *Rotifer vulgaris*, under favourable circumstances, might enter. Morren has recently observed, with the aid of high magnifying power, that in specimens of *Vaucheria clavata*, found at Everghem, he distinctly detected the same animalcule, with its ciliæ imitating the wheel, &c. Morren one day opened one of these cells, and waited to see the animalcule spring out and enjoy the liberty so dear to all creatures, even to infusorial animals ; but no—he preferred to bury himself in his prison, descending into the tubes of the plant, and to nestle himself in the middle of a mass of green matter,—rather than swim about freely in the neighbourhood of his dwelling.—*Abridged from Morren's Paper in Ann. Nat. Hist. Jan. 1841.*

Turpin on the cause of the Red Colour of Agates.—The red colour of Agate is owing to a number, greater or smaller, of *Protococcus Kermesinus* (one of the lower Algæ), accumulated together, or more frequently reduced to their small red globules (seminules) agglomerated or coagulated, and distributed according to certain circumstances, in the colour-

less structure of these silicious compounds. By microscopic and comparative investigation, Turpin was led to conclude that, the various colours, rose, orange, blood-red, and reddish-brown (varieties owing to more advanced growth) which are enclosed in, or which surround the translucent and colourless structure of different kinds of Agates, will be found to be owing to the presence either of red globules, uniformly mixed as in the Carnelian Agate, or agglomerated into small irregular clots, and distributed into circular waves, according to certain forms or conditions which existed at the time of the silicious conglomeration; or, finally, though more rarely, to these small red vegetables themselves, quite entire, and most distinctly visible with the microscope. It is impossible to find a resemblance in colour and polish more striking, than that which is seen in a white glass phial filled with *Protococcus Kermesinus*, when compared with a carnelian, as may be fully established by the trial.—*Turpin in Jameson's Journal, Vol. 25.*

Instrument for measuring Refraction.—At one of the recent meetings of the Royal Physical Society of Edinburgh, Dr. Wilson exhibited an instrument for measuring the refracting powers of different substances, invented by Mr. Alexander Bryson, of Edinburgh. The instrument consists of a compound microscope with a moveable platform underneath, for holding the refracting medium over a fine line, which is to be viewed through it. The platform must be raised or lowered, until the line is distinctly seen through the microscope, and as the distance at which this takes place depends on the refracting power of the medium, the graduated scale on which the platform moves indicates the refracting power. Dr. Wilson considered the invention of great importance to the mineralogist and the chemist, as it enables them to ascertain the refracting power of very minute substances.—*Inventor's Advocate, No. 77.*

New Species of Auricula.—On carefully examining sand from Van Diemen's Land, with a view to discover microscopic shells, my attention was directed to four small shells of the genus *Auricula*, for which I propose the name of *A. pellucida*. It is thus characterized:—*Testa minima, ovata, obtusa, albida, nitida; spiræ brevis; longitudinaliter transversimque tenuiter striata: labro non reflexa; columella biplicata.*

Shell hardly a line in length, pellucid, obtuse, with two small plaits on the pillar lip, the upper of which is the larger, and projects farther into the mouth of the shell. The four specimens above described are in the collection of the British Museum.—*Editor.*

Microscopic Objects.—We have much pleasure in recommending to the notice of Microscopists Mr. C. M. Topping, of No. 26, Bride Street, Liverpool road, Islington, who has devoted himself with much zeal, for the last three or four years, to this increasing business. His terms are moderate, and the objects very carefully prepared.—*Editor.*

V.—ON THE STRUCTURE OF THE TEETH OF DENDRODUS STRIGATUS AND
DENDRODUS COMPRESSUS,

By Richard Owen, Esq., F.R.S., &c. Pres. Micros. Soc. Lond.

[Continued from page 8.]

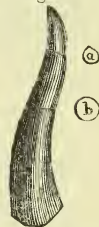
A SECOND and smaller tooth from the same formation and locality differs from the preceding in its more elongated and slender conical form, with a nearly circular transverse section as seen in the margin; it also differs in the absence of the two longitudinal ridges, and in the presence of broader, deeper, and more close-set longitudinal impressions, separated by intervening convex ridges. As those characters strongly indicate a specific difference, it may be convenient to attach to this the name of *Dendrodus strigatus*; (fig. 1.) its microscopic structure, as shown by a fine transverse section, proves it to be generically allied to the *D. biporcatus*.

Fig. 1.



In the *Dendrodus strigatus* the central system of reticulate medullary canals occupies a larger proportion of the mass of the tooth. The radiated canals or processes of the pulp are shorter and more branched: the systems of calcigerous tubes which diverge from the numerous processes and branches are separated from each other by a fine and clear line, and terminate in a broader band of calcigerous cells. The appearances which the structure of the teeth thus present in the transverse section, somewhat resemble those of the tooth of *Myliobates*; but the lobes or systems of calcigerous tubes are less regular in form and size.

Fig. 2.



Dendrodus sigmoideus.

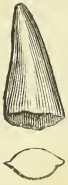
A third tooth, long, slender, and cylindrical, differs from the preceding in having a smooth surface. It is also bent in a sigmoid curve (fig. 2, *a* and *b*, are transverse sections of the parts they are opposite.)

A fourth tooth, the *D. compressus*, presented a more compressed conical figure than the two preceding, and the opposite ridges, which characterize the *D. biporcatus*,* here form, as it were, the margins of two

* The characteristic ridges of this tooth are shown in Fig. 5. They were not expressed in the wood-cut of the preceding number.

cutting surfaces, and the opposite end of the flattened elliptical transverse section of the tooth. The length of this tooth

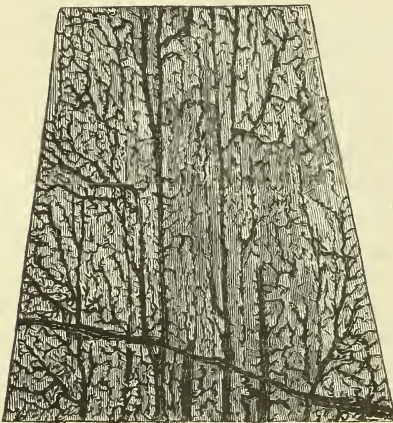
Fig. 3.

*Dendrodus compressus.*

the rest of the tooth (fig. 4.).

This section exhibited eight principal medullary tubes—the four largest and closest together were situated in the centre—the others diminishing as they approach the side. The central ones run parallel

Fig. 4.



to each other, and to the axis of the tooth along the basal half; the two middle so continuing to the apex. The small lateral tubes bend outwards to the side of the tooth—the third on each side sends off one or two primary branches in the same oblique direction—and also finally terminates by bending towards the margin of the tooth.

The primary divisions of the large medullary tubes run

parallel, or nearly so, to the trunks, but begin slightly to diverge as they approach the apex of the tooth. The primary divisions of the small lateral tubes are given off at different angles, but always acute. The smaller or secondary branches are given off frequently at right angles, and those from the primary branches sometimes retrograde to the main tubes. The plan of branching of the whole system of medullary canals which pervades the entire substance of the tooth is strikingly similar to that of certain forest trees, as the elm, but, with this characteristic difference, which distinguishes in this, as in most other cases, the branching of an animal from a vegetable structure, namely, that the terminal branches anastomose, forming a coarse but elegant net-work, occupying with considerable regularity the whole of the interspaces of the longitudinal medullary tubes.

A transverse section of this tooth exhibits three-fourths of its central part occupied by a reticulo-medullary structure; and the peripheral portion traversed by medullary rays. In the central structure are seen the area of numerous nearly equal-sized and equi-distant medullary canals, around which the dentine is disposed in well marked concentric layers, and from which the calcigerous tubes radiate, as in the *Myliobates* and *Orycteropus*; but these tubes are relatively fewer and less parallel in their course, and form more decided reticulations in that course. The shape of each component denticle, thus seen in a transverse section, is more rounded and less regular, than in either of the two above cited instances. The cellular cement, which separates each denticle, is relatively thicker. The diameter of the central medullary canal is equal to two-thirds of the diameter of the laminated and tubular wall of the denticle, of which it forms the axis. In the peripheral structure the radiated trunks are shorter in comparison with the central cellular part. They are relatively wider apart from each other, and are less parallel in their course. Their primary divisions diverge at a more open angle, and their lateral branches are longer.

The branches of the radiating canals, after dichotomising, are resolved at their extremities into radiated systems of calcigerous tubes, terminating in a thin stratum of calcigerous cells. This stratum forms the boundary of each system, and thus describes an undulating line on each side of the radiated canals, which is very similar to the anfractuous inflected layer of the external cement in the *Labyrinthodon*. In the transverse section of the *D. compressus* the calcigerous tubes seem to form, towards their extremities, a fine net-work with open meshes, and to be fewer, and a greater relative distance from each other than in the first described species.

It is obvious that the plan of the structure, as exhibited in the longitudinal section of the tooth of the *Dendrodus*, bears considerable analogy to that in the Shark, and in the Scomberoid fishes, as in the *Sphryæna*, *Dictyodus*, &c.; but one cannot fail to recognize a greater amount of parallelism in the medullary tubes in the *Dendrodus*; and the systems of calcigerous tubes which diverge from the medullary canals, still more strikingly exhibit the difference which depends upon their straighter and more parallel course, and which indicates the higher type of structure in the *Dendrodus*. These tubes, in fact, instead of forming the inex-

Fig. 5.

*Dendrodus biporcatus.*

tricable moss-like reticulations which occupy the median spaces of the medullary canals in the Shark, here run at right angles to the sides of the tube from which they are continued, and parallel to each other, as far as the middle of the interspace, and there meeting in the extremities of the opposite series of calcigerous tubes, are lost in minute cells.

VI.—OBSERVATIONS ON INFUSORIA.

By Professor Ehrenberg.

On the influence of a low temperature on the Infusoria.—The researches of Ehrenberg agree with those of Spallanzani, and prove that cold is generally fatal to Infusoria, especially to the *Rotatoriæ*. It is even more destructive to the living animals than to the eggs; but water when recently thawed may be found inhabited by individuals which have escaped death, and enclose the germs of future generations. The animals generally die after they have been encased in ice from one hour and a quarter to two hours; but it appears that at the moment when congelation of the water takes place, each animalcule is surrounded by a small cavity, which seems to be the result of its proper heat. A sudden thaw always produces a fatal effect on the Infusoria. They are found in winter at the lower surface of ice, covering ponds, &c.

Heat instantaneously kills infusory animalcules: the eggs and the animals equally perish. Several species are, nevertheless, capable of supporting a temperature from 45 to 50 degrees (Reaumur?). This heat is less hurtful when it takes place gradually.

Light is favourable to their production, but it is not absolutely necessary; for they are even found in deep mines: such for example as Schlangenberg, Fribourg, &c. Too strong a light is unfavourable. The infusoria are sometimes found in waters towards the north; but a particular circumstance might influence them in this situation. Heat causes the developement of currents of gases which draw with them the Infusoria; so that they are more frequently found on the warm side, than on the side towards the light. The difference between day and night is not appreciated by the Infusoria.

The *electric spark* acts differently, according to the power and the species on which it is tried; generally the animals found in the current are dead, if not by the first spark, at least by the second. The animals found in the current of the galvanic pile, or of a magneto-electrical

apparatus, are instantly killed ; but to effect this, it is necessary that decomposition of the water takes place, and that the wires be approximated to within from one to three lines of each other. All animalcules which approach are as it were struck with lightning.

Atmospheric air is necessary for the existence of Infusoria, and especially the *Rotatoria*; it is, therefore requisite that a small hole be cut in the cork of the bottle in which they are kept. The smaller species very soon die ; those of the genus *Chlamidomonas* live five days under a layer of oil. The Infusoria can only live beneath the air-pump as long as there is a small quantity of air ; the larger animalcules soon perish, when thus treated.

Oxygen produces but little effect on Infusoria. A small proportion of *Nitrogen* added to atmospheric air, and transferred to a vessel containing Infusoria, caused them to die after twenty days ; and a small proportion of *Hydrogen* similarly added, killed them after seventeen hours.

All *Chemical substances*, which do not change the composition of the water, exercise no influence over the Infusoria ; not even the strongest poisons, if they are not more than mechanically mixed with it. The fresh water Infusoria are killed by a drop of sea-water, which, however, contains a large quantity of Infusoria. *Strychnia* destroys them, in the same manner as putrid water, by promoting an expansion. *Rhubarb* is swallowed without producing any effect. *Arsenic* was swallowed by *Hydatina senta*, but which animalcule did not die until some time after. *Calomel*, *Corrosive sublimate*, and *Camphor*, did not cause death until after some hours. *Wine* and *rum*, like *sugar*, destroy many of the Infusoria, which are found in drinkable water. — *Mandl Traité Pratique du Microscope*, p. 427, 1839.

VII.—ON THE SOURCE AND MODE OF OBTAINING MICROSCOPIC SHELLS, &c.

By J. S. Bowerbank, Esq. F.G.S. &c.*

THE minute Foraminifera, and other shells and remains, found in such abundance in the sands in which the Grignon and other Calcaire Grossière shells are embedded, have long furnished an interesting series of

* In a Letter to the Editor.

objects to the lovers of microscopic research. Similar minute and beautiful objects have of late years been found to abound in some parts of the Suffolk crag, and very recently they have been found, but more sparingly, in the London clay; and especially in the sandy beds of that formation at Bracklesham Bay, in Sussex. Ehrenberg has figured similar beautiful little fossils from the chalk formation of England; and they have also been observed in great profusion attached to the under surface of tubular flint, and embedded in the mass of the greater number of the tuberous nodules of flint in the upper beds of the chalk; and they are likewise found in the chests of the green-sand formations, and in many other similar silicious masses. The wide distribution of these highly interesting and beautiful little fossils, and the facility with which they can be obtained, renders it exceedingly desirable that they should be carefully and systematically examined and compared with the recent shells of the same families; and it is in the hope that some of your numerous scientific friends may be induced to undertake so pleasing a task, that I have troubled you with these few lines, to point out an easily, accessible, and very abundant source for procuring recent minute shells of a similar description.

If the sand and dust shaken out of the West Indian sponges into the bins or casks in which they are kept by the large dealers in sponge, be swept up and examined, it will be found to abound in minute shells, corals, and other interesting remains of marine animals; and among them many specimens of *Foraminifera*, &c. are found, which appear, from the hasty examination that I have bestowed upon them, to approach very closely indeed to many specimens of the same family that I have seen in the fossil state. Species of *Echini*, spicula of sponges, and an infinite variety of minute organic remains will reward the researches of the observer. The sponges themselves, in the state in which they are imported, are also well worth the trouble of a careful examination, especially those parts that are usually trimmed from the base as being too full of impurities to be sold; many very beautiful specimens are thus found attached to the fibres of the sponge. I have not found many organic remains in the sand shaken out of the Turkey sponges; but it is probable that if the sand from such sponges, obtained from other localities, were to be carefully looked over, new and interesting subjects would be the result of such an investigation.

[It may be interesting to observe, that the *Foraminifera* appear to be very generally distributed both in a recent and fossil state. The small quantity of sand contained in almost every marine shell, &c., will, on careful examination, be found to afford a variety of the objects mentioned above.]—*Editor*.

VIII.—ON THE MEANS OF PREVENTING TREMOR IN MICROSCOPES*

By Mr. Andrew Ross.

It would be needless here to insist upon the importance of *steadiness*, or perfect freedom from vibration, for the successful prosecution of Microscopic observations. Numberless contrivances have been resorted to for the purpose, the most successful of which, is probably the use of a very large mass of stone or metal as a support for the instrument. But the necessary weight of such a mass, involves inconveniences which quite prevented its general adoption, and have led to the application of expedients, which, without entirely destroying the vibrations, should render them as little injurious as possible. I may mention as one tolerable arrangement of this sort, my own mode of supporting the compound body on a bar, which, together with the stage, form one solid casting, so that the vibrations, which in this case take place principally from the joint, affect the body and the stage as nearly similar as possible, and produce an effect certainly much less prejudicial, than when the compound body, supported only at its lower extremity, vibrates not only to a much greater extent, but independently of the stage. As, however, all the expedients hitherto resorted to are either imperfect, or nearly impracticable, I was induced to make a series of experiments, with the details of which I will not trouble the Society, but will merely describe, that, which after many trials and modifications I have found to be the most successful.

The principles it seems to demand are—

1st. That a very large proportion of the weight of the instrument (say nine-tenths or thereabout) be supported upon springs.

2nd. That the remaining one-tenth or thereabout be supported upon soft felt, or other fibrous substance.†

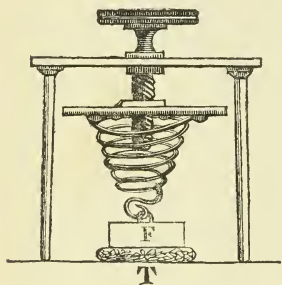
3rd. That the attachment of the springs be such as to *suspend* the weight, because if supported by placing the springs underneath the weight, lateral stays would be required, and through these, vibrations in the plane of the table might be transmitted to the instrument.

One method of applying these principles is by the apparatus shown

* Read at the Microscopical Society of London, 1840.

India rubber would probably answer the purpose better than felt.—*Editor.*

in the annexed diagram, one of which is to be applied to each foot of the Microscope. T represents the table upon which the instrument stands; F the end of one of the feet of the Microscope; the part between T and F the felt or other fibrous substance. A hook is shown



at the end of the spiral spring, and another hook in the foot of the Microscope, by which the spring and instrument are connected. The other end of the spring is fastened to the plate into which the screw acts. This screw is supported by the plate above, and again this plate is supported by three legs which stand upon the table, only two of which are shown in the diagram. The apparatus is adjusted by the nut at the top, which turns the screw and raises the plate and spring connected with it, until a sufficient quantity of the whole weight of the

instrument is supported. The necessity for the screw adjustment is that, when the instrument is differently inclined, the weight varies upon the same feet; there is also a difference in the character of tremor, which requires a different adjustment of the springs, to prevent it being communicated to the Microscope; an example of this is where the tremor is produced by the rapid motion of carriages along the streets, and that produced by a person walking in a room. In the first case a great proportion of the weight must be supported by the springs, and in the latter the feet of the Microscope should have some considerable pressure upon the table.

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1840*]

Microscopic Parasites.—As an example of minute and organised parasitical bodies destroying the living body or part upon which they grow, may be mentioned that Laurent discovered minute Fungi in the eggs of *Limax agrestis*, which by their increase completely destroyed the embryo. Ehrenberg observed the appearance of *Chætophora* (*Tremella*) *meteorica* upon the scales of *Salmo eperlanus*. Hanover has described the growth of *Conferva* upon the toes of *Triton punctatus*, and Henle has observed parasitical Infusoria upon the same animal. According to this observer the parasitical ani-

* Translated and communicated by Dr. W. H. Willshire.

males were species of *Vorticella*. Schönlein saw the growth of Fungi in the pustules of *Porrigo lupinosa*; and Langenbeck noticed the development of highly organised members of this division of the vegetable kingdom, in the body of a person who had sunk under typhoid fever.

Microscopic Plants in Snow.—Several new microscopic forms have been described by Thienemann as existing in snow. This author has described a new genus of plants allied to the Bysoid and Leptomyoid Algæ, the characters of which are :—*Filis liberis, articulatis, dichotomis, dense sibi implicitis, in nivis superficie crescentibus, apice sporis valde intumescente sicco statu capitulum formante*.

The species (3) of this genus appear at first as minute, and for the most part agglomerated vesicles, showing under the greatest magnifying powers a coat composed of a single layer. These vesicles, which are completely spherical at first, assume an oval shape at a later period, and an active molecular movement of hitherto unobserved particles, with a separation of the coat into two layers is seen. As this molecular movement goes on internally, the inner layer of the coat separates into two portions, which at the same time extend themselves longitudinally, the moving particles of the interior now ceasing to be visible. The molecular movement again commences along with a new division of the previously separated portions, which as before increase longitudinally. At a later period, however, the terminal cells alone divide, the central ones increasing in size, and soon after which longitudinal division is seen to take place. At last an active molecular motion is visible within one of the terminal cellules, the molecules gradually increase in size, the terminal cellule expands, which, when the fructification is complete, presents the appearance of a little head filled with spherical spores.

Meteoric Paper.—The microscope has been ably employed by Ehrenberg to determine the composition of the Meteoric Paper of 1686, and which he states is a product of *Confervæ* and *Infusoria*, now existing on our globe. According to this author the substance known by the name of Meteoric Paper, and which fell near Rauden, in Curland, in 1686, is formed of filaments of *Conferva crispata*, thickly matted together, with remains of a Nostoc, twenty-nine well preserved species of Infusoria, and the cases of *Daphnia pulex*. Of the twenty-nine Infusoria eight only have silicious *Loricæ*, the rest have soft coverings. In the Meteoric paper of Schwazenberg, Ehrenberg found *Conferva capillaris*, *C. punctalis*, and *Oscillatoria limosa*, along with twenty distinct species of Infusoria, &c. In a mass found in Sweden, *Ædogonium vesicatum*, (Link) Infusoria, and the pollen of some Coniferæ were discovered.

Growth of Hair.—M. Mandl is inclined from some phenomena which he has observed in the growth of hair, to arrive at a different conclusion relative to this process from that generally received. He states that, in individuals who have had their hair recently cut, each hair preserves its

diameter to its free end which presents a truncated extremity, where the eye may distinguish the section both of the cortical part, and that of the internal canal. But if these same hairs are examined after a long interval, each hair is found to be terminated by a pointed extremity, more or less long, but with its extremity closed. This change of form M. Mandl considers to be the result of a vital process, and as proving the possibility of a movement of fluids in the interior of the hairs. He thinks this opinion is still further supported by the fact, that when hair is kept long, instead of the formation of a pointed extremity, obliteration of the extremity of the canal alone takes place, which he supposes to be caused in all probability by the difficulty of the movements of the fluids.—*Amer. Jour. Med. Science. Transl. from Comptes Rendus*, 1840.

Remarks on M. Mandl's observations, by Mr. George Busk.—This opinion is perhaps still further corroborated, when we consider the strict analogy between hairs and feathers. A quill may in fact be considered as a large hair, and no one doubts a continued power of development in feathers until they have reached the full size. This continued growth, must be attended with circulation of fluid—probably like that in the cells of plants. No hair of any animal is a simple tube, but the interior of all is cellular, like the interior of a quill. The cells in most hairs are irregular, but in some they are remarkably regular in size and distribution, among which may be specified the fine hairs of all Rodents, and of many other animals, as the mole, ornithorynchus and others. In this class of hair the colouring matter is confined strictly to the cells. The growth of the beautiful hairs of the bat tribe, can hardly be explained without allowing them an independent power of development.

It is difficult in many hairs to demonstrate the cellular nature of the internal structure; and the opinion that the human hair is a simple tube, has, we should be disposed to imagine, arisen from optical deception. We have seen a hair taken from the chin of a native of New Zealand, whose face was closely tattooed, and which hair was of a bright blue colour, from its having taken up some of the colouring matter used in tattooing. Under the microscope this hair showed the cellular structure very distinctly; it was rendered manifest by the colour. In hairs, whose cellular structure is not regular, the colour appears to pervade all parts of the hair; from which we may probably conclude that the regular colour-cells, in the fine hair of Rodents and others, are more analogous to the cells of adipose tissue, and are specifically intended for the secretion and retention of the colouring matter.

[*From Oken's Isis*, 1839.]*

Dujardin on Microscopic Insects.—This observer had previously shown, that the *Rhizopoda* have no skin, at least on a portion of their surface; but that they possess a soft, glutinous substance, capable of extending itself into moveable threads. In October, 1839, he dis-

* Translated and communicated by Mr. G. F. Richardson.

covered in the Seine an animalcule of this kind which he names *Gromia fluviatilis*. It consists of a round skinny sac one-third of a millimeter in thickness, filled with a glutinous substance of homogeneous nature, intermingled with thicker grains, and perforated with an aperture from which the animalcule protrudes branched threads, with which it creeps on water-plants. These threads are remarkable for the frame-works of the skin (Spannhäute) between every branch, which indicate the absence of the skin on these threads.

He further remarked an appearance of life in the embryo of *Distoma cygnoides* from the bladder of the frog. The native eggs are $\frac{1}{2}$ of a millimeter in length, and exhibit an embryo $\frac{1}{4}$ less in size which every moment changes its form and situation by means of glittering ciliæ, which cover its surface. This analogy of the embryo with the ciliated infusoria, such as *Leucophrys* is the more striking, since the *Distomata* at maturity have no trace of ciliæ.

He has also communicated some new observations on the spermatic animalcules of the carp. When taken from the semen they are mere round immoveable globules $\frac{1}{400}$ of a millimeter in size. When placed in water they immediately move very rapidly, become one-fourth larger, and exhibit a thread which they agitate like a tail. In the course of five minutes their motion becomes weaker, their diameter is increased to $\frac{1}{270}$ of a millimeter, the tail becomes curved, and almost wholly coiled up; at the end of ten minutes the diameter is $\frac{1}{250}$ th, and of an hour $\frac{1}{200}$ th. After some time they disappear altogether.

Turpin on the Globules of Milk.—They vegetate and nourish themselves in this substance exactly like the globules of the blood, the lymph or nervous mass, or the bulbs of the hair; in short, like all those elementary organisms, of which the organic structure consists, and which derive their support from the surrounding slimy fluid. They are composed of two vesicles, and contain smaller globules, together with oil producing a greasy substance; their size extends to $\frac{1}{100}$ th of a millimeter; when exposed to some degree of warmth they become four times this size and then burst. They still vegetate in an independent manner, as the outer skin breaks, and pushes out the inner branches, which become entangled like the axes of potatoes germinating in a darkened cellar. They at length become *Penicillum glaucum*, and plant themselves by means of buds and seeds, particularly on the surface of milk, of cream, and of cheese. If the globules are placed between two glasses with a little water they soon germinate, and change to the *Penicillum glaucum*, which radiates on all sides and bears fruit. They may be preserved in this manner for a whole year. The sleep-apples (*Schlaff-äpfel*) of the rose, the excrescences of which, under the name of *Eri-neum*, were conceived to be fungi, are no more independent plants, than the hairs of animals are independent creatures. If, however, in the one case the cells, and in the other the bulbs of the hair, did not come forth till after the death of the body, we should consider them as independent plants. This is the case with the globules of milk. What then can a portion of organic matter be said to be? Nothing but a mass of innumerable globules endowed with vital energies, which

only wait a favourable opportunity to develop themselves. The leaven of bread, according to Cagnard Latour, is nothing but a similar mass of globules. I, therefore, perceive no difference between the globules of milk, and the cells of animals and of plants, which are prolonged into hairs. Additional proofs are thus constantly afforded of the principle which I announced in my work published in 1805, under the title of Procreation, that an organic body consists of nothing more than a mass of Infusoria, and that procreation is nothing more than the aggregation of Infusoria, spermatric animalcules of which do not naturally consist of defined species, but of simple vesicles or slime.

Meyen.—The spermatric animalcules of *Liverworts* and *Mosses* have tails like those of animals, and develop themselves singly in the grains of pollen, and also in the *Chara*. The globules are only cells of slime in which the animalcule forms itself. The cell then disappears, and the animalcules lie curled in a spiral form in the thread of pollen, which bursts in water, and releases the animalcule. They at first cling by their long tail to the thread, but subsequently swim about freely and quickly. In *Marchantia Polymorpha* a single animalcule proceeds from every cell of pollen mass. In *Hypnum argenteum* the masses of pollen adhere for a long time to each other. A. VON HUMBOLDT and J. MULLER have seen their motions. They are those of true Infusoria, and not like those of the Molecules of Robert Brown.

Elie de Beaumont.—The Tripoli of Bilin in Bohemia is a tertiary bed situated on a hill, the base of which is Pläner Kalk, or Tuffkreide, on which are deposited four beds.

1st. Clay some metres in thickness.

2nd. White Tripoli four metres, in which Fischer and Ehrenberg have found Infusoria.

3rd. Yellow loam four metres.

4th. A Bed of semi-opal in thin laminæ and friable.

Turpin has examined such friable semi-opals, and found but few organic remains; some yellow globules of *Protococcus*, with others blackish and striped like the eggs of Infusoria; some organic threads, and the foot of an insect, probably *Acarus*. This is by no means singular, since, during their deposition from water, organic remains might easily be introduced.

On Animalcules contained in Chara.—Thuret has observed in the interior of the Anthers (globules) of *Chara vulgaris* and *C. Hispida*, flexuose, transparent, chambered filaments of unequal length, in which are contained animalcules at first motionless, but after a time they move and struggle to release themselves from their prison. In this they do not always succeed, although their twisted position attests the efforts made for disengagement. They appeared like a spirally-rolled thread of three to five curves, with two appendages, bristles, or tentacula of excessive tenuity, which the animalcule incessantly agitates with great rapidity.—*Abridged from Ann. des Scien. Nat. Vol. XIV. p. 65.*

Observations on the particular Appendages of the Caudicula in the Sexual Apparatus of Orchideæ, and in several species of the tribe of Vandææ, by M. Mutel.—The distinctive character of the tribe *Vandææ* is the presence of the *Caudicula*, whose office is to bind the pollen masses to the gland of the stigma. This *Caudicula*, examined with care, offers particular appendages, which are the true ligaments serving to hold the masses of pollen on the *Caudicula*. These ligaments, most frequently very short, and rarely more than one or two in number, are sometimes simple, sometimes bifid, or two-lobed, sometimes much developed, sometimes scarcely distinct, and nearly always of another colour, or at least of a different tint to the *Caudicula*. They are generally entirely lodged in the interior of the pollen masses, or in their furrows, when such exists; or further they are surrounded by their approximated bases, so that they are always invisible when they are in their situation. But when the masses are gently dispersed, the ligaments may be seen to become by degrees disengaged and elongate considerably, until the moment of the separation of the masses, and thus having become free at the summit they suddenly shorten, and remain at the summit of the *Caudicula* of a variable shape, but constant in each genus, and as they have marked diversities of form in different genera, I have given them the name of *freniculæ* (frenicules) to these ligaments, as independent of their particular form, and indicating their special use. These *freniculæ* form, according to their nature, colour, elasticity, and state, the passage of the masses of pollen to the *Caudicula*. In the case of the bifid, or two-lobed state of the *freniculæ*, they separate into two distinct branches, each of which then holds a mass of pollen.—*Comptes Rendus*, 17 Aug. 1840.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

March 17th, 1841.—*George Loddiges, Esq. F. L. S. in the Chair.*

Dr. John Lee, Mr. Thomas Law Wheeler, and Mr. H. White, were proposed as members.

A paper was read from Mr. George Busk, Surgeon to the S. H. S. Dreadnought, being "Observations on the Structure of *Tricocephalus dispar*." This communication will be inserted entire in our next.

The Chairman stated that, owing to the increasing number of specimens and books recently acquired by the Society, the Council considered it necessary to appoint an office of Honorary Curator and Librarian; and they were happy to be able to recommend Mr. John Quekett, a gentleman they considered eminently qualified to fill the office. The recommendation on being submitted to the Meeting was carried unanimously.

It was also stated that the Report read at the First Anniversary Meeting, together with the President's Address, had been printed, and was ready for distribution.

The Meeting then resolved into the usual Microscopic Illustration and Conversazione.

Microscopical Memoranda.

The late Francis Bauer, Esq.—Mr. Bauer continued, up to a late period, his microscopic researches and drawings; but unwilling to risk the chance of leaving any work unfinished, he at last determined to rest, and to attempt no more. Seated near his microscope, which long use had made almost essential to his happiness, he spent his hours, in re-examining what his pencil had so admirable perpetuated, and reviewed, in the monuments of his labour, the history of his life. Mr. Bauer was born at Feldsberg, in Austria, on the 4th of October, 1758, and died at Kew on the 11th December, 1840.—*Athenæum*.

Circulation of Vallisneria.—In the majority, and probably in all the cells of *Vallisneria*, it may be noticed, that, besides the green granules hitherto observed to circulate, I have distinctly seen a much larger *transparent colourless body*, varying in size, which moves with the green granules, several of them usually adhering to it. This body may probably be considered as a rudimentary cell, developed upon one of the green granules as its cytoblast. It may likewise be stated, that, this appearance is only to be defined with the achromatic condenser (*eclairage*), and has doubtless been overlooked from want of attention to the management of the light.—*Mr. George Busk, Surgeon, &c.*

Guyon on living Worms under the Conjunctiva—Blot of Martinique, has, like Bajon of Cayenne, and Mongin of St. Domingo, seen two worms in active motion under the conjunctiva, which he removed by incision. One of these which was sent to M. Blainville, was thread shaped, thirty-eight millimeters long, with a black protuberance adapted for suction.—*Dublin Journal, &c.*

On mounting Opaque Objects.—The plan usually adopted of mounting opaque objects on dead black paper, is objectionable on account of the small fibres on the surface of the paper reflecting some considerable portion of light. The plan best adapted for mounting minute objects to be viewed either opaque or transparent, is simply by placing them on a piece of crown glass with a little weak gum-water, and surrounding them to the extent of a quarter of an inch or more with a rim of cardboard sufficiently thick to prevent the object being removed or broken, when another slide is placed intentionally or otherwise upon it. By using the *stop* the object is made opaque, and an even and uniform dark-coloured field is by this means obtained.—*Editor.*

On the structure of Normal and Adventitious Bone.—Mr. Alfred Smee found on examining, by means of a microscope, very thin sections of bone, prepared in a peculiar manner, a number of small, irregularly-shaped, oblong corpuscles, arranged in circular layers round the canals of Havers, and also rows of similar bodies distributed around both the external and the internal margins of the bone. Each corpuscle is connected by numerous filaments, passing in all directions with the Haversian canals and the margins of the bone, and also with the adjacent corpuscles. He finds that the canals of Havers are vascular tubes con-

taining blood. The corpuscles themselves are hollow, and their cavities occasionally communicate with those of the canals; their length is equal to about two or three diameters of the globules of the blood. They exist in cartilaginous as well as osseous structures, and are found in every instance of adventitious bone, such as callus after fracture, morbid ossific growths either from bone or from other tissues; and the author has also ascertained their presence in the bony and cartilaginous structures of inferior animals, such as birds and fishes. Measurements relating to these corpuscles, by Mr. Bowerbank, are subjoined, from which it appears that their diameters vary from about the 10,000th to the 4,000th, and their lengths from the 2,300th to the 1,400th part of an inch.—*Proc. Roy. Soc. Jan. 23, 1840.*

Infusorial Animalcules in Red Snow.—Mr. Shuttleworth relates, that being occupied in the examination of some red snow that fell at the Grimsel, and expecting to see only inanimate globules of *Protococcus nivalis*, he was astonished to find, that it was composed of organized bodies distinct in nature and form, partly vegetable, but the greater number endowed with the liveliest powers of motion, and belonging to the animal kingdom. Among these he named one species *Astasia*, (Ehrenb.) *nivalis*, and another *Gyges sanguineus*.—*Bibl. Univ. (Ann. Nat. Hist. Vol. V.)*

Notes on the Parasites of Birds, by Mr. Charles Ager.—Whilst engaged in making microscopical preparations for the late Tweedy John Todd, M.D., of Brighton, (1500 of which have been purchased by the Royal College of Surgeons), I made a collection of the Parasites of a considerable number of British birds, and shall be happy to furnish, from time to time, drawings and observations on their structure, presuming that, as little has appeared on the subject, it may not be uninteresting.

The external forms of many of them are very curious, and their organization (which in the microscopical preparations, I have been enabled by a *peculiar process* to develope very satisfactory) is very complex, especially their respiratory system (*tracheæ*), beautiful ramifications of which may be traced into every part of the body, even down to the claws.

In many instances the male and female differ very much in form; and several birds which I have examined had two distinct kinds, differing altogether from each other, both in form and size. Their relative sizes, in regard to that of the bird they infest, is also curious; as in those of the house-marten and swallow. The Parasite of the latter bird, although the larger of the two, is not bigger than the cheese-mite, while that of the former is as large as the sheep-tick, measuring fully a quarter of an inch in length, and is something like the latter Parasite in form; excepting that the marten's Parasite has appendages like wings, being the only instance I have met with. It generally lodges itself on the neck of the bird, and adheres with great firmness to the feathers, which is not surprising when we see it provided with such powerful claws. Indeed the most minute kinds are well provided in

this respect, as, besides a double, and sometimes as in that of the marten a triple claw, many of them are furnished with a patella, similar to that of the *Dytiscus marginalis*.

In many of them the legs are set horizontally with the body, and have only a lateral motion, so that although they are enabled to make their way very quickly amongst the feathers, they cannot make the least progress, when laid on a smooth surface; others when set on the smoothest surface run very swiftly.

[The sketches, which accompanied this communication, on examination were not found to be new or undescribed; and as figures have appeared of them in other works, we have not thought it advisable to give them. The Parasite obtained from the house-marten alluded to above is *Stenopteryx Hirundinis*, a Dipterous insect. That of the swallow belonged to the Apterous order, *Chelytus*?—Editor.]

Observations on the Blood-corpuscles of certain species of the Genus Cervus.—Mr. George Gulliver, has found that the blood of the Muntjac (*Cervus Reevesii*), the Porcine (*C. Porcinus*), and the Mexican Deer (*C. Mexicanus*), contains, together with corpuscles of the ordinary circular form, a still larger number of particles of less regular shape; some curved and gibbous in the middle, and acutely pointed at the ends, with a concave and convex margin, like a crescent; others approaching more nearly to segments of a circle; some shaped like a comma, being obtuse at one end and terminated by a pointed curve at the other; others having an acute projection of the convex part, so as to constitute a triangular, or even quadrangular outline; some having the figure of the head of a lance; while a few presented a double or sigmoid flexure, as if they had been twisted half round at the middle. Like the ordinary blood-discs, these peculiar corpuscles are deprived of their colouring matter by water; but with only a small quantity of water they quickly swell out, and assume an oval or circular figure, forming long beard-like strings by the approximation of their edges. In saline solutions they become rather smaller, but preserve their figure tolerably well.—*Proc. Roy. Soc. Feb. 6, 1840.*

Microscopical Society's Cabinet of Objects.—It may not be generally known to our readers, that the Microscopical Society of London is desirous of forming collections of interesting objects for reference, and that Mr. John Quekett has been appointed the Curator, to whose care their arrangement, &c. is entrusted. Some months since the Council decided upon two sizes for the glasses on which the objects presented to the Society's Cabinet should be as far as practicable mounted; they are as follow:—*Three inches by one inch*—and *three inches by one and a half inches*. For the convenience of members a cutting-board and diamond is kept in the charge of the Curator, the property of the Society, which may be made use of by Members on application.—*Editor.*

IX.—OBSERVATIONS ON THE ANATOMY OF THE TRICOCEPHALUS
DISPAR.*

*By George Busk, Esq., Surgeon to the Hospital Ship
Dreadnought.*

It is not the intention of this paper to enter into a detailed account of the anatomy of this common entozoon, which has been correctly described in most respects by preceding observers, but merely to direct the attention of those interested in the subject to some points in which all Helminthologists, so far as I am aware, have erred.†

The form of the worm, as is well known, consists of a long, slender, anterior portion, and a thick and shorter posterior part, which in the female is slightly curved, but in the male coiled in the same plane. The visible organs comprise, a digestive and generative apparatus, the true arrangement of which latter it is the principal object of this paper to elucidate—but I will, previously, briefly describe the former.

The mouth, small and orbicular, communicates with a narrow, straight, and very short œsophagus, terminating in a sacculated or moniliform intestinal tube, which occupies the whole length of the filiform part of the body—in the centre of which it lies, supported in its position by narrow filamentous bands, passing from it at regular intervals to the external parietes of the worm. At the junction of the thick with the slender portion of the body, this sacculated intestine terminates, by opening into the dilated commencement of that part of the digestive tube which is situated in the thick part of the body, and which part of the tube differs very materially from the sacculated portion just described, and it may, probably, be considered as the large intestine. It may at all events be conveniently and properly divided into three portions, under the names of cæcum, colon, and rectum.

* Read at the Microscopical Society of London, March 17, 1841, and communicated by the Author.

† Since this paper was read, the Author has found on referring to the Versuch einer Naturgeschichte der Eingeweidwürmer, von J. A. Goeze, 1787, p. 116, tab. vi, fig. 4, that the vulva and external oviduct are accurately described and figured by that writer; a fact which makes it the more remarkable that this arrangement should have been overlooked by succeeding observers.

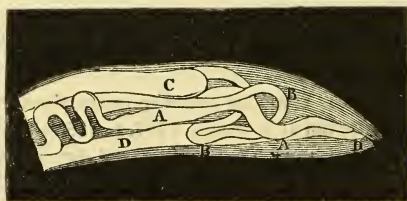
The cæcum, E, fig. 1, is the dilated commencement of the large intestine, and though differing in shape in different individuals, is usually quite distinct from the succeeding colon, with which it joins, at an abrupt angle. The colon, which nearly corresponds in length with the thick part of the body, is nearly straight, and of uniform diameter, never saccu-



lated, or moniliform. It is usually much overlapped by the generative apparatus, but is not surrounded or entwined by that tube. Within a short distance of the posterior extremity of the worm, the colon terminates in a narrow, straight, contracted tube, which may be considered as the rectum, D, fig. 2. The colon gradually tapers into the rectum, and in this tapering part the internal surface presents a striated appearance, as if it were furnished with cilia, which are absent in the rectum, and are not visible in any other part of the intestine. The interior of the cæcum is covered with rounded folds. The walls of the rectum are thick, and probably muscular, and this part of the intestine may occasionally be seen to move, so as to become straighter, long after all other evidence of life is extinct in the animal. The anus is in the form of a narrow fissure, with two prominent labia, one of which projects beyond the other; and at this part the continuity of the integuments of the worm, with the walls of the rectum, may be readily seen.

The generative apparatus in the female, consists of a long tube, which may be divided in four parts, and considered, as an ovary, an internal oviduct, or Fallopian tube, a uterus, and an external oviduct and vagina.

Fig. 2.



The ovary commences (as at A, fig. 2) with a closed, and generally somewhat pointed extremity, close to the rectum, with which it is in apposition, but to which it does not appear to be attached, as it does not follow

the movements of that intestine, in those instances in which the latter may be observed to move. From this point the ovary proceeds forwards, in the form of a serpentine tube, as far as the anterior part of the thick portion of the body, where it ends in a blunted extremity from which the internal oviduct arises. This tube, which is much narrower than the preceding, passes backwards in a nearly straight course, to the posterior extremity of the body, where, after making one or more turns around the rectum, and passing a little forwards, it ends in the usually rounded and dilated commencement of the uterus.—(C, fig. 2.) The uterus is by far the widest portion of the generative tube, and when full of ova occupies the greater part of the body of the worm. It is much dilated and straight, and terminates anteriorly in the external oviduct, which is a narrow tortuous tube, with very thick and apparently firm walls. It first makes several convolutions, (D, fig. 1) and becoming nearly straight, finally opens in the surface of the body by the vulva.—(E, fig. 1.) This opening is situated nearly at the junction of the filamentous and thick portions of the body, and, consequently, in situation nearly corresponds to the entrance of the moniliform intestine into the cæcum. The form of the orifice is various, being sometimes circular, and sometimes that of a transverse fissure, with one continuous, or two much elevated labia. The surface of these labia resembles exactly that of the sheath of the male spiculum, being, like that, covered with acuminate papillæ. From this opening the ova can be readily expressed:—enveloped in, and slightly attached to each other by a viscid mucus, containing minute granular particles. The ova, when thus emitted, resemble very much the cysts of the *Trichina spiralis*, having like them thickened and elongated extremities. No distinct embryo, however, can be seen within them, as can be done, according to some writers, in the ova of *Strongylus*, *Ascaris*, and other nematoid worms. The ova assume their last covering and elongated form in the anterior part of the uterus. In the other portions of the generative tube they are rounded, and have a very thin, indistinct capsule.

In the male *Tricocephalus*, the arrangement of parts is very similar to that in the female, except that as the seminal outlet in the male is situated in the posterior extremity of the body, there is no occasion for a tube corresponding to the internal oviduct, or Fallopian tube. The generative apparatus in the male consists of a tortuous, tubular testicle, which resembles in size, shape, and situation, the ovary of the female; commencing like it by a narrow blind extremity near the rectum, whence it passes forwards, and in the anterior part of the thick portion of the body turns backwards, and becomes continuous with a straight

dilated, seminal receptacle, or as it may be termed, vas deferens, corresponding to the uterus. Before making this turn, however, the testicular tube may in some instances be observed to become dilated into a small pouch. The vas deferens, or seminal receptacle, occupies nearly the whole length of the thick body, which it also nearly fills. It is usually constricted in several places at irregular intervals, shewing the presence probably of circular, muscular fibres, and it finally terminates towards the posterior extremity of the body, in a narrow straight canal in which the spiculum is lodged.

From this account it follows, that—

1st. The *Tricocephalus* has a distinct vulva, and that the generative and digestive tubes do not communicate at a cloaca, nor terminate at a common orifice, as described by most writers on the subject.

2nd. That in the presence and situation of the vulva, this entozoon obviously very closely resembles the *Strongylus*, and most other nematoid worms; and thus an apparent great anomaly in the arrangement of this class is removed.

3rd. That the alimentary canal is not so simple as is commonly supposed.

4th. That the *Tricocephalus* is in all probability simply oviparous, and that the ova become perfectly formed only a short distance from the orifice, perhaps from being, there only, within reach of the male fluid.

I may, perhaps, be allowed to add, that considerable advantage in the examination of the interior of objects such as this worm, is gained by placing behind the object, when viewed as opaque, a silver plate not very brightly polished.

X.—ON THE OCCURRENCE OF THE ANIMALCULE OF *VIBRIO TRITICI* IN BLIGHTED GRAINS OF THE EARS OF WHEAT, CONSTITUTING WHAT IS TERMED EAR-COCKLE, PURPLES, OR PEPPERCORN,*

By the Rev. J. S. Henslow, M.A., F.L.S., &c. &c.

It is now just a century since Needham first made known an extraordinary fact, concerning the blighted grains found in the ears of wheat, infected by a disease known under the name of the ear-cockle, purples, or, as I find it called in this part of Suffolk (Hitcham, Bildesten), the

* From the Journal of the Roy. Agricul. Soc. of England. Part I. Vol. II. p. 19.

peppercorn. The grains which are thus infected turn dark green at first, and ultimately nearly black; and they become rounded, somewhat resembling a small peppercorn, but with one or more deep furrows on their surface. The husks of the chaff become spread open, and the awns are twisted, by which means the infected ears are readily observable among the standing corn. Upon opening the blighted grains, they are found to be filled with a moist, white, cottony substance; but to contain no flour. When Needham placed this cottony mass in a drop of water under his microscope, he perceived to his surprise (as I did lately to mine, before I was aware that the fact had been previously noticed), that it was composed of a multitude of minute eel-shaped animalcules, which were in active movement, twisting and wriggling to and fro, like so many eels or snakes. The announcement of Needham's discovery summoned several observers into the field, of whom no one was more persevering or intelligent than Roffredi. His papers in the fifth and seventh volumes of the "Journal de Physique," contain the results of more than five years' patient investigation into the economy of these minute creatures. In the "Philosophical Transactions for the year 1823," M. Bauer has also given the result of his personal observations and experiments, carried through an equally long period, and without his having any knowledge of what Roffredi or others had already done so long before him. He has given faultless drawings of the animalcule (*Vibrio tritici*) from the state of the egg to its full growth, and, as it is seen under the highest powers of the microscope. The disease which it occasions is said to be sometimes very injurious to the wheat-crop; but I presume it must be very local, for it was unknown to some of the earlier writers on the diseases of corn, who sought for it without success; and, I could not learn, upon a limited inquiry, that it was known to the farmers near Cambridge, or at Saffron Walden. In the parish of Hitcham, Bildesten, Suffolk, however, it is well known, and my miller informs me that he often has samples of wheat much infected with it; and among what he calls the tail-corn (the last portions of a particular batch), he has found as much as half a peck in a bushel. He says also, that when the cottony mass, composed of the animalcules, is extracted from the grain in the process of grinding, it does not pass through the cloth with the fine flour in the beating, but remains behind with the bran. When a sound grain of wheat is sown by the side of one infected with the *vibrio*, the young plant which springs up from the former is not infected before March; but then the animalcules begin to find their way from the blighted grain into the earth, and thence into the young corn. They gradually

ascend within the stem till they reach the ovule (or young state of the seed) in the flower-bud, even before the ear has shown itself. Roffredi believed that they do not increase in size till they have reached the young seed, but that after this they grow very rapidly, soon deposit a large number of eggs, and then die. M. Bauer has questioned the accuracy of Roffredi's observation, and supposes the specimens found in the stem to belong to another species. The young are hatched in about eight or ten days after the eggs are laid, and speedily attain to about the $\frac{1}{33}$ of an inch in length, and the $\frac{1}{1200}$ of an inch in diameter. When full grown the *vibrio* acquires a monstrous size compared with one of the multitude which composes the cottony mass in the blighted grains, becoming a quarter of an inch long, and the $\frac{1}{80}$ of an inch in diameter. I am not aware whether any precise estimate of the numbers actually found in a single grain has ever been made, but a slight calculation will show us, that not less than fifty thousand of the young *might* be packed in a moderately-sized grain of wheat. M. Bauer seems to think that more than one generation are produced in the course of a season. The most curious circumstance which observers have noticed in the economy of this animal, and which I have had an opportunity of fully verifying, is the wonderful property it possesses of retaining its vitality under circumstances in which we should have supposed it impossible that it could have lived. If a mass of them is suffered to become so perfectly dry, that the slight touch of a hair might reduce them to powder, and they are again moistened in a drop of water, they will speedily revive, and become as active as before. They may thus be dried and revived many times before they are killed. M. Bauer states the limit to such revivals to lie between six and seven years. I happened to possess an ear of wheat infected with this disease, which had been sent me (I think) at least six years ago, but which I had not minutely examined before; and upon soaking some of the blighted grains in water for a few hours, the animalcules revived, and were quite as active as those I found in the first fresh grains, which I had been examining only two days previously. If the eggs are once dried, or even the young animalcules themselves, before they have attained a certain size, they will not revive on being moistened. It does not appear that the *vibrio* attacks any other corn than wheat; at least it has not been observed to do so. But barley, rye, oats may become infected by sowing them in the same hole with the grains of wheat which are filled with the *vibrio*. The experiment, however, succeeds with difficulty and only to a small extent. I have observed that scalding the water kills the *vibrio*; and this may suggest the possibility of exposing infected

samples to a temperature that might be sufficiently high to kill these animalcules, without being so hot as to destroy the germinating powers of the corn, and thus endeavour to prevent the occurrence of the Ear-cockle, &c.*

XI.—†REMARKS ON MR. BUSK'S OBSERVATIONS ON VALLISNERIA.

By Dr. W. H. Willshire, Lecturer on Botany, at the Charing Cross Hospital.

IN reference to the communication of Mr. Busk, on Vallisneria, in the last number of the Journal, allow me to remark, that it appears to me that the existence of the phenomenon therein mentioned has been known some years. In 1837 Meyen remarked it, and in 1838, in the 2nd vol. of his Neues System der Pflanzen Physiologie, he noticed it more fully, and delineated the circumstance as existing under certain of its conditions; but I presume the first announcement of the fact will be found in the 13th vol. of the Nova Acta Acad. Nat. Cur. I shall trouble you with the following translations upon the subject:—"The green granules in *Vallisneria spiralis* are provided with an elliptical appendage, which is of a lighter green colour than the granules themselves, and composed of a mucoid semi-hardened matter," &c., Meyen, 1837. "It will be seen (referring to a particular diagram) that besides the green granules existing in the cells, there are distinct mucoid masses here and there enveloping the granules, and moving along with them as in company, or else keeping separate near the walls of the cells, and moving along exactly in the same manner as the green granules do. In almost all cases the green granules move first, and the mucoid mass, which is of a lighter colour, follows them. When the granule, provided with its elliptical mass of mucus, directly approaches the wall of the cell, the mucoid mass becomes drawn out or extended," &c., Meyen, 1838.

Mr. Busk refers to a *much larger transparent colourless body, varying in size, which moves with the green granules, several of them usually adhering to it*,—Meyen to a much larger body—for no less than six

* We have directed the attention of Microscopists to this fact, in the hope that as the season advances those having the opportunity will further prosecute the inquiry into this interesting subject.—ED.

† In a letter to the Editor.

green granules, in one case, and four in another, are delineated by him as connected with the mucoid appendage; also varying in size, as is seen in the diagram of his work, and moving along with the green granules, as the present translation states. Meyen, however, calls the mucoid appendage of a lighter, clearer, or brighter (as the word may be rendered) green colour than the granules themselves; whilst Mr. Busk says it is colourless. This appears to me to be the only discrepancy between the statements, after an attentive weighing of the matter. I refer, of course, only to the *existence of a fact*, and make no comments upon the physiological *purposes* which the mucoid appendage is supposed to answer, either by Meyen or Mr. Busk. In the valuable work of this Physiologist, I have particularly referred to some pages which are devoted to the subject.

XII.—ON A WHITE INCRUSTATION ON STONES, FROM THE BED OF THE RIVER ANNAN.

By Edwin Lancaster, M.D., F.L.S.

DURING a short stay which the author made last summer on the banks of the Annan, in Dumfriesshire, his attention was arrested by the appearance of the stones on the banks of the river. Wherever a mass of gravel was exposed to the air, the surface of the stones appeared covered with a white incrustation, as if they had been white-washed. This appearance was more or less general on all the exposed banks, but was most evident on the stones nearest the water's edge. On examining the stones with a pocket lens, their surface appeared covered with acicular crystals, and from this it was at first concluded that the incrustation arose from the crystalization of some salt abounding in the water. On procuring, however, some stones from the water itself, they presented on their surfaces the filaments of a minute *conferva*, which appeared to be the source of the white crust; but as the existence of the *conferva* would not explain the crystalline appearance, it was examined under the microscope, and the appearance was found to proceed from minute acicular bodies about $\frac{1}{100}$ th of an inch long, and $\frac{1}{2,000}$ th of an inch broad, which were most of them arranged in a stellated form, but many were scattered in all directions. Running under the whole were the filaments of a minute *conferva*, on which the acicular bodies rested.

In Greville's "Scottish Cryptogamic Flora," these bodies are re-

ferred to the genus *Exilaria*, but the stellate arrangement of the aciculæ gave them a different character to *E. fasciculata*. Hooker in his continuation of Smith's "English Flora," has placed Greville's supposed plant as a synonym of *Diatoma truncatum*, from which *D. fasciculatum* is not distinct.

In Ehrenberg's great work on the *Infusoria*, these bodies are figured and described under the head of Polygastric Animalcules (p. 11. tab. xvii.) of the family *Baccillariæ*. The genus to which they belong is *Synedra*, and is distinguished by the animal being furnished "with a simple silicious prismatic carapace, when young attached by one end, when old often free, without any, or a slightly marked pedicel." The species it most closely resembles is the *Synedra Ulna*, (common eel-animalcule), which is characterized by being striated with linear corpuscles, straight, truncated at the sides, flat on the back and belly, with the apex a little dilated as they become aged. The bodies from the Annan are not striated, nor are their ends dilated, although they appear full grown. The silicious skeletons in which these little animals are invested, will account for their white appearance. Although these bodies have been often described both as plants and animals, no notice appears to have been given of producing the phenomenon here described. —*Proc. Linnæan Soc.* 1840.

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1840.]

Globules of the Blood.—Carus has observed, that as decomposition of an animal body proceeds, the globules of the blood in the capillaries first become green, and then pass into a green-coloured fluid. This he considers as a further proof of the views of Schultz, that the globules of the blood, which are of no further use, become changed into bile.

Mandl has found that the globules of the blood in *Crocodilus lucius*, possess in comparison with their breadth a greater size, longitudinally, than the blood globules of any other animal whatever. Their breadth is $\frac{1}{100}$ to $\frac{1}{95}$ of a Millimetre, their length $\frac{1}{35}$ to $\frac{1}{80}$ Mm. Their nuclei are sometimes round—sometimes elliptical. In *Proteus Anguinas*, the breadth of the globules is $\frac{1}{30}$ Mm., their length $\frac{1}{16}$ to $\frac{1}{18}$ Mm. With the exception of the Camels and Dromedaries, the relation of the greatest breadth and length of the globules of the mammalia is, taking their diameters as = 1 : 1;—In the camels, the birds, reptiles, and fishes = 1 : $1\frac{1}{2}$ to 2; whilst in the crocodiles it is = 1 : 2 to 3.

Nasse gives the following measurements of the blood globules in man :—

	DIAMETER.		
Whole globule	0",00027	0",00028	0",00030
Breadth of the ring	0",00005	0",000075	
Diameter of the central circle	0",00015	0",00017	
Thickness of ring	0",000045	0",000066	0",000075
Apparent thickness of the centre	0",00002	0",00003	

According to Gulliver, *Perameles lagotis*, *Petaurus Sciurus*, *Macropus Bennetii*, *Dasyurus ursinas*, and *D. viverrinus*, have the globules of their blood of the common form seen in the mammalia, and $\frac{1}{4800}$ " to $\frac{1}{3000}$ ". In *Auchenia Vicugna*, *A. Paco*, and *A. Llama*, they are elliptical, but smaller in the first creature than in the rest.

Tragalus Javanicus has the smallest of the hitherto examined globules, being generally $\frac{1}{12000}$ ", sometimes $\frac{1}{15000}$ " to $\frac{1}{9600}$ ".

Nasse found that in the embryo of the adder the blood globules were smaller than those of the mother.

Schleiden has observed in the Parenchyma of the leaf of *Pellia epiphylla* a peculiar kind of *proper vessels*, which are filled with a pale yellow or purplish red fluid, but which are absent in *Aneura pinguis*.

Spongilla lacustris.—The so called Sporangia of this organised body, rightly placed by Meyen in the animal kingdom, are, according to him, essentially distinct from the Sporangia of the Algæ, and are similar to what are denominated the *winter eggs* of Polypi. They consist of a coriaceous skin, which is covered over with a thick crust, except at a small circular spot. This crust is composed of minute and delicate silicious particles of the $\frac{3}{50}$ th of a millimetre in length, which particles are composed of vertically placed spicula of $\frac{1}{250}$ to $\frac{1}{200}$ th of a Mm. broad, at whose extremities near the circumference, more or less toothed, little disks are found. At an after period from 4—5, or more generally 7—8 of the teeth elongate, becoming uncinat and curved rays. Between the spicula exists carbonate of lime, having a cellular structure. Within the eggs there are delicate cells filled with various granular matters. Besides the larger silicious spicula found within the substance of the sponge, there exist more delicate ones of the $\frac{1}{16}$ to $\frac{1}{10}$ th of a Mm. long, having upon their surface numerous little points, which elongate as their age increases.

[From Oken's *Isis*, 1839.]

Doyere on Distoma.—Before the anterior sucking apparatus of these animalcules is placed a canal filled with fluid, containing globules of different sizes; it passes on each side of the body, forming a complete circle, and opening again into itself behind the middle of the sucking apparatus; it then pursues a single course, makes several turnings,

and expands into a kind of cloaca, which is capable of being retracted through the anus, like a glove, or like the antennæ of snails. This is the so-termed elongation of the tail, of authors. Doyere considers this canal only as a stomach with a *cul de sac*, which is elongated as far as the posterior part of the body, and the hinder portion he considers as a kind of thin intestine. In living animals, in a solution of carmine, the stomach is coloured, and frequently the upper canal. He has characterized the following species:—*D. excisum*, *D. rufo-viride*, *D. appendiculatum*, *D. cylindraceum*, *D. hepaticum*. The globules in the tissue of the *Cysticercus* of the rabbit, in which they are very plentiful, are nothing more than microscopic concretions of carbonate of lime.

Colin and *Edwards* placed stalks with leaves of *Polygonum tinctorium* in water, under a receiver, in the sun-shine, and obtained oxygen gas; in common day-light, after some days, they produced a little carbonic acid gas, but a great quantity of hydrogen gas.

Milne Edwards on the Nature and Mode of growth of the stems of *Polyps*.—Almost all zoologists consider the horny, as well as the calcareous corals, to be mere external inanimate crusts, simple separations of the skin, as in the serpulæ. This opinion he has discovered to be erroneous, and he considers these firm coverings to be animate, and to form as much a part of the body as the cilia or the organs of digestion, nourishing themselves like the rest of the animal, however hard they may be; they are, in fact, he states, an outer skeleton. (We believe this opinion to have been entertained for some years.) He has been induced to form this judgment in particular, from the examination of a *Sertularia* from the coasts of Provence. This genus consists, it is well known, of a horny tube, having internally a soft and hollow substance, which supplies the place of a stomach. The genus under observation is very thin on the younger portions, but much thicker on the older. This might be conceived to arise from a deposition of new layers on the outer surface. He has however observed, on placing a transverse section under the microscope, that the walls of the exterior tube are everywhere of equal thickness, and that it is only the inner soft substance which has become thicker; whence it follows, that the external tube must grow and nourish itself. The same process prevails with regard to the stony corals; they must receive calcareous particles, like the cartilage in its metamorphosis into bone.

C. H. Schultz has discovered, that the vesicles or globules in the blood of the elephant killed a short time since at Potsdam, differ from each other far more than those of other mammalia. This, doubtless, proceeds from the cotemporaneous presence of young, older, and very old globules. This blood, in particular, contains many newly-formed vesicles, the membranes of which are scarcely coloured; some appearing round, others flat, others folded. He also observed semilunar and elliptical globules, which he regards as instances of the transformation of the globules of chyle into blood.

[From the *Comptes Rendus*, 1841.]

Dutrochet on the circulation of Chara.—The cause of the circulation in *Chara* has hitherto escaped research; the known moving powers in no way explain it. Dutrochet was led to investigate whether there did not exist some physical motion, of which the cause was equally unknown, and which might bear some analogy to the motion observable in *Chara*. By reasoning on the subject, he was led to consider that a similarity existed to the movements produced by small particles of camphor when placed on the surface of water, and provided they were motionless, would cause the fluid to be put in motion in their vicinity. Is it not then, says Dutrochet, reasonable to conclude that the moving power which animates as it were the pieces of camphor, is identical to that animating the fixed green globules situated on the internal walls of the central tubes of *Chara*, and from which green globules evidently emanates the motive force of the circulating fluid in contact with them, and that also of the inert corpuscles contained or carried with the fluid? The result which Dutrochet arrives at, after a lengthened and comparative series of experiments, is, that the physiological power (force) producing the circulation of *Chara*, and the physical force which produces the movement of camphor when placed on the surface of water, are identical.—[In this memoir, which is of considerable length, the Author enters into the history, and gives the results of his experiments, with a view to detail the true cause of the movement of camphor on the water; and he then takes successively the several experiments he has made on the circulation in *Chara*, and endeavours to apply them by comparison to analogous experiments made with the camphor.]

M. Ofterdinger has presented to the Academy of Sciences, at Paris, a new process for investigating the intimate structure of organs.

M. Jerichow presented at the sitting of the 1st of February, 1841, a description of an instrument he had invented, and to which he has given the name of *Thermo-Micrometer*.

M. Letellier, at the sitting of the 8th of February, 1841, addressed a note to the Academy relating to the *microscopic research of some animal fluids*.

Valenciennes on the cause of the green colour of certain Oysters.—The reasons given for the cause just cited are very various, and leave much room for investigation. Some authors attribute their green colour to their feeding on certain *Ulvæ*; others consider it to depend on the absorption of microscopical animalcules which have received the name of *Vibrio Ostrearius*. After investigating the subject experimentally, the conclusions which M. A. Valenciennes arrives at, are, that the green colour of oysters is due to animal matter, which is different from all other green organic substances hitherto noticed. As it is found in the intestinal canal, is it not reasonable to suppose that it is due to a particular state of the bile, thus furnishing a coloured substance which is fixed by assimilation on the parenchyma of the two lamellæ of the oyster,

on its branchiæ or labial palpæ, by a physiological phenomenon, analogous to that which M. Flourens has observed connected with the assimilation of madder, which colours only the bones of animals, whilst the cartilages, ligaments, and tendons remain white. This green coloured substance above noticed, when submitted to microscopic examination, offers nothing remarkable, but possesses other properties given in detail in the communication.—*February 15, 1841.*

Targioni Tozzetti on the presence of Iron in Oscillatoria in the thermal springs of Rapolano, although no iron exists in the water.—M. Libri presented to the Academy a memoir in which the author above quoted observes the fact mentioned. He cannot therefore conceive from whence these plants obtain iron, since none is to be found in the water itself.—The iron contained in these *Oscillatoria* accumulates by degrees in the cavities where water is contained, as in the stony pits which are formed, and thus its presence can be sought after, and proved by chemical analysis. This remarkable observation opens much the field of inquiry of late promulgated respecting the influence possessed by exceedingly minute organized bodies accomplishing the production of certain minerals.—*February 22, 1841.*

[*From the Annales des Sciences Naturelles.*]

On the Structure of Annular Vessels in Plants.—The result of the recent researches of Hugo Mohl shows, that the development of the annular vessels agrees with the observations on proper vessels; from the examination of these two organs it appears that the annular, spiral, and reticulated vessels, offer three different forms, intimately united, and passing frequently one into the other, but hitherto they have only been considered as degrees of temporary transformation of the same vascular utricule. It is true, that a spiral structure is the ordinary and normal state of the secondary layers of the vessels. It is not, however, the only one which may be there recognized: the annular structure exhibits a primary form, and offers, in some degree, the intermediate state between the spiral turned to the left, and that to the right. On the other hand, the reticulated structure is also met with as a primary tissue, in approaching sometimes more to the pure spiral, sometimes to the annular form. These researches in the annular vessels are directly opposed to those of Schleiden. Mohl is far from affirming that Schleiden has incorrectly observed them; on the contrary, he is of opinion, that he is an active and practised phytotomist and manager of the microscope. Mohl considers, nevertheless, the interpretation of that which Schleiden has observed, to be incorrect, he having noticed the variation of form as being constantly accidental, and as degrees of regular, transitory, and necessary metamorphoses.—*Oct. 1840.*

On the Circulation of the Blood in Pyrosoma.—Milne Edwards observes, that the heart, which has hitherto escaped the observation of anatomists, is situated at the lower part of the body, at the side, and beneath the mass of viscera. There is a similar arrangement in *Ascidia*;

it contracts also in a peristaltic manner, and here also the direction of the vermicular motion periodically changes, exactly in the same manner as among *Ascidia*; and as in these animals the same vessels perform alternately the office of artery and vein, the abnormal mode of circulation is here verified in all the great natural divisions of the class *Tunicata* of Lamarck; it appears, however, interesting to observe, that so remarkable a physiological phenomenon, and which has not been hitherto noticed in any other type of the animal kingdom, is not found wanting in any of the animals composing the intermediate group between the true *Mollusca* and the *Polyps*.—*Dec.* 1839.

On Cells of a particular structure in the Aroideæ, by Dr. Schleiden.—In the *Meletemata Botanica* of Schott and Endlicher, they attribute to *Monstera* Adanson, (*Dracontium pertusum*, Mill.) raphidophorous ovaries. Not being acquainted with any of the Aroideæ in which the ovaries offered a quantity of vessels of raphides, I was curious to ascertain whether the plant in question exhibited anything remarkable on this point, that might be mentioned in its generic character. On examining attentively the ovary of the plant, I found that the so-called raphides were not inorganic bodies. The carpellary leaf of the genus *Monstera* is traversed with cells of the liber of a very singular structure. These cells are in length nearly 0.1 to 0.13 Paris inches, and their thickness from 0.004 to 0.0042 Paris inches. Their sides are formed of a number of very distinct layers, perforated with pores, the orifices of which are flattened on the sides. In the interior of these cells of the liber, which are filled with a granular substance of gum, &c., are cytoblasts developed, and on these cytoblasts very thin cells are formed. These here and there break through the pores. Many of these cells have lateral branches, varying in size; and it appears to me very probable, that these branches are formed by the walls of the cells, the cavities of which are placed in communication with that of the parent cell, in consequence of the absorption of the diaphragm. It has been, however, impossible for me to follow completely the history of their development. Similar formations are found in the bark and pith of *Rhizophora Mangle*.—*Wiegman. Archiv. fur Naturgesch.* 1839, l. p. 231.

[*Revue Zoologique*, Nov. 1840.]

Duvernoy, on a species of Sponge which lodges itself in the shell of Ostrea Hippopus Lam., by forming canals in the substance of its valves. (*Read at the Academy of Sciences, Paris, 2nd Nov. 1840.*)—After having stated that several *Mollusca* have the singular faculty of piercing and forming a retreat in the hardest stones, and that naturalists are not as yet satisfactorily agreed on this point, M. Duvernoy states, that he observed something analogous at Dieppe, where he saw several *Patellæ* attached to rocks, and in the substance of which they had formed a pit of some millimetres in depth. The form of the pit was exactly modelled to that of the shell. He considers that the *Mollusca* excavate these holes by the same means as *Lithodoma*, *Petricola*, and *Pholades*, and that it can only

be effected by means of an acid excretion, which softens or dissolves the stone.

After these considerations, the learned professor announced, that he had found *Ostrea Hippopus*, the valves of which were perforated with holes or orifices of canals, varying in diameter from a quarter to two millimetres. He found in these canals a spongy cylindrical body, exactly filling their cavity, like a cork, and furnished with an external opercular appendage, which is distinguished from that in the interior of the canal, by its being of a deeper colour. After having given a description and good figures of this little sponge, M. Duvernoy proposed to place it in the genus *Calceponge* of M. De Blainville, and gave it the name of *Spongia terebrans*. Its characters are as follows:—
“Cylindrical, branched, brown or pale yellow, externally lighter coloured in the rest of its length; filled, or nearly so, in this first part, and more fibrous than membranous; hollow, of the form of intestine in the rest of its extent, and more membranous than fibrous.”

(Scientific Congress of Italy, held at Turin, 1840.)

[*Extracts from the Zoological Section.*]

Dr. Nardo, of Venice, read two memoirs relating to the anatomy of fish. In the first, he noticed the intimate structure of the skin, and deduced from his observations, new theories for the systematic division of this class. In the second memoir he noticed some anatomical differences presented by the cartilages of some fish, above all in Selaciens and Sturgeons.

Prof. Civinini, of the University of Pisa, communicated his discoveries relative to the jointed nature of the nerves of man and superior animals, forming, at the shoulder, (à l'épaule) a ganglion or plexus, which he discovered and first described.

Dr. Rusconi made known his anatomical process to examine the internal structure of the embryos of small animals, which it is impossible to see in the ordinary method of observing them.

M. Michelin read a treatise on some stony polyps (pierreux), forming a new genus, which he named, in honour of the President of the Zoological Section, *Caninia*.—Dec. 1840.

The third meeting of the Scientific Congress of Italy, will take place this year at Florence, on the 15th of September, and will last till the end of that month.

Microscopical Memoranda

M. Soleil's new Pocket Microscope.—*M. Donné* submitted to the notice of the Academy of Sciences at Paris, at their sitting 22nd February, 1841, a Pocket Microscope, specially destined for medical men, botanists, and travellers. This instrument, magnifying three hundred times, gives results equally satisfactory with the superior microscopes of ordinary manufacture. It may be applied to all the microscopes of Trécourt and Oberhaeuser. It was made by *M. Soleil*, optician, and the price is only thirty-five francs. It may be made into a table microscope by means of a foot on which it can be fixed; and is so arranged that the observer can obtain the *direct* light from the sky, or from a lamp, without the necessity of a reflecting mirror.—*Comptes Rendus*, 22nd February, 1841.

Mode of viewing objects.—Much of the beauty of the objects seen depends upon the management of the light that is thrown upon or behind them; which can only be fully mastered by practice. It may be remarked, however, as a general rule, that in viewing those which are transparent the plane mirror is most suited for bright day-light, the concave for that of a lamp or candle, which should have the bull's-eye lens, when that is used, so close to it, that the rays may fall nearly parallel on the mirror: if the bull's-eye lens is not used, the illuminating body should not be more than five or six inches from the mirror. The latter is seldom required to be more than three inches from the object, the details of which are usually best shown when the rays from the mirror fall upon it before crossing; and the centre should (especially by lamp-light) be in the axis of the body of the microscope. For obscure objects seen by transmitted light, and for outline, a full central illumination is commonly best: but for seeing delicate lines, like those on the scales of insects, it should be made to fall obliquely, and in a direction at right angles to the lines to be viewed.

The diaphragm is often of great use in modifying the light, and stopping such rays as would confuse the image; but many cases occur when the effects desired are best produced by admitting the whole from the mirror.

If an achromatic condenser is employed instead of the diaphragm, its axis should correspond with that of the body; and its glasses when adjusted to their right place should show the image of the source of artificial light, or, by day, that of a cloud or window-bar in the field of the microscope, while the object to be viewed is in focus.

The most pleasing light for objects in general is that reflected from a white cloud on a sunny day; but an Argand's lamp or wax candle with the bull's-eye lens is a good substitute.

A large proportion of opaque objects are seen perfectly well (especially by day-light) with the side illuminator and the dark box as a back ground; and for showing irregularities of surface, this lateral light is sometimes the best; but the more vertical illumination of the Lieberkuhn is usually preferable, the light thrown up to it from the mirror below being, with good management, susceptible of much command and variety.—*James Smith*.

XIII.—ON CERTAIN PHENOMENA OBSERVED IN THE GENUS *NITELLA*,
AS ILLUSTRATIVE OF THE PECULIAR STRUCTURE RECENTLY DIS-
COVERED BY MR. BOWERBANK IN A FOSSIL WOOD FROM THE LONDON
CLAY.*

By Arthur Farre, M.B., F.R.S., &c., Secretary to the Microscopical
Society of London.

THE observation of a new form of vascular tissue occurring in the fossil wood from the London clay, as detailed by Mr. Bowerbank in his paper,† has induced me to offer a few remarks on an apparently analogous *recent* structure, which I several years ago observed in some specimens of *Nitella flexilis*, kept for the purpose of examining the circulation in that plant.

Before proceeding to detail the result of my own observation, I may be allowed to quote that portion of Mr. Bowerbank's paper in which this new fossil tissue is described. The author observes, that in the Herne Bay fossil "some of the vessels contain large vesicular globes, which appear to have been freely floating within their parietes; when not in contact with each other, they are perfectly globular and uncompressed. They vary very considerably in size, in some cases filling nearly the whole diameter of the vessel, while in others they do not occupy a tenth of that space. They are frequently so numerous that they fill the whole of the vessel. The structure of which these globular bodies is formed is thin and very pellucid, and no fibre or other organic structure is apparent upon its surface. There are also in some of the vessels exceedingly small vesicles, interspersed among the larger ones. A portion of these are opaque and black, but the greater number of them are transparent like the larger ones. These very minute vesicles do not exceed in size the globules of circulation in *Valisneria*, and as we find vesicles of every size, intermediate between these minute ones and the largest of the vesicles, it appears probable that the whole of them may be attributed to a more than ordinary development of globules of circulation, analogous to those observed in *Valisneria* and other plants." The author further remarks, that he has "never seen this curious form of tissue in any other wood, either recent or fossil; though he had occasionally observed very similar, large pellucid globules slowly moving in the great central cavity of the stem (of

* Read at the Microscopical Society of London, November 25, 1840.

† An abstract of this paper will be given in a future number.

Chara), while the circulation of the smaller globules in its parietes has been proceeding with a much greater degree of rapidity."

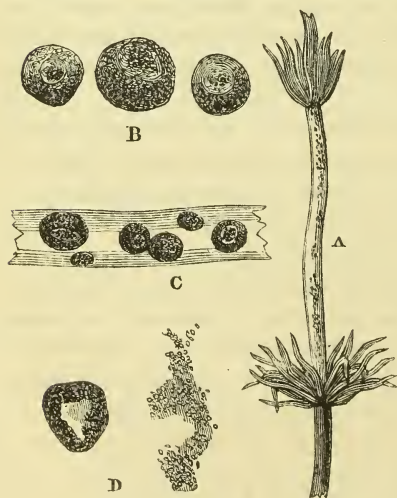
These particulars with reference to the structure of the fossil wood, and the resemblance to *Chara*, so happily conjectured, are so completely borne out by what I have observed in *Nitella*, that the description of the one might almost serve for that of the other.

In some specimens of *Nitella flexilis*, the circulation was observed to be going on vigorously up to the 4th of April, 1835. On the 6th, two days after the last observation, the circulation had entirely ceased. The green particles lining the interior of the stems and branches had shrunk from the parietes, and, together with the green circulating matter of the interior, were collected together in irregular masses within the tubes; but none of the brown bodies afterwards observed, were as yet apparent in any of the pieces.

On the 11th, five days after the preceding observation, and no intermediate one having been made, the same specimens were again examined, and were found to present characters which I had not before observed. In many of the joints, the irregular masses of green matter had resolved themselves into globular bodies of variable size, but definite form, and had changed from a green to a rich brown colour.

About half of the joints had undergone this change—the other half remaining in the green state as at the last observation; but the circulation had entirely ceased in all, and the plant was evidently dead.

In the greater number of those joints which contained the brown



bodies, the green matter had entirely disappeared, leaving the tubes as transparent as glass, with the brown globules like rows of beads irregularly scattered in their interior—(fig. a.) These varied very considerably in number. In one long joint of the plant, about eighty of them were collected, while in one of the short branches there were only five. Some of the larger bodies were about half the diameter of the tubes in which they were contained, while others were only one-eighth of the diameter.

Those which were completely formed, had all the same character.

They consisted of tolerably regular spheres, except where their form had been slightly altered by lying in contact with each other. In almost all of them, however, and especially in the larger ones, there was a slight flattening, or a cup-like depression at one point (fig. *b, c*), which was generally observed to be directed towards the surface of the tube, and might have been produced by the globules coming in contact with the parietes of the tube, but was, nevertheless, retained after they were extracted from it. In the centre of this flattened portion, or cup-like depression, there was always observed to be a small collection of granules, which were of the usual size of the globules of circulation, but also of a brown colour. The brown bodies, on account of the now transparency of the containing tubes, could be examined as readily *in situ* as when extracted from the joints. In either case they appeared to consist of an enveloping membrane, which was probably formed by the aggregation of the green granules of the plant, assisted by the condensation of the mucous fluid of the interior; and thus forming an investing capsule, which, when torn open, was found to be filled by the *green* granules of the plant, mixed with mucous fluid—(fig. *d*). The investing capsule was very thin, and presented no other traces of structure than that which would arise from the formation of a membrane by the aggregation of granular matter.

In those joints in which the brown bodies had been formed, the green matter of the plant had in most cases entirely disappeared. In others, where they appeared to be in process of formation, they were observed to be mixed with the green matter, and in other parts again, they had not yet undergone the change from green to brown, but shewed themselves in the form of irregular masses of green matter approaching the spherical form.

It appears, then, that this remarkable change had taken place within a week after the circulation had been observed to be going on vigorously in the plant. And the nature of the change appears to be this:—The green granules which lined the internal surface of the joints when living desert the parietes, and, together with the green circulating granules of the interior, collect together in irregular masses in the centre of the tube, which then resolve themselves into irregular spheres, still retaining the granular outline, indicative of their formation by aggregation, but which they afterwards lose on assuming a more perfect spherical form, and become bounded by an investing capsule which turns of a rich brown colour, while the contained granules retain their original green.

It is difficult to imagine what purpose is intended to be answered by such a change taking place, after the circulation, and other evidences of

life in the plant have ceased. Yet, the idea of such a change being the result of a merely fortuitous arrangement of the component particles of the plant, attendant on decomposition, is negatived by the circumstance of the remarkable uniformity and symmetry of the resulting globules, which appear to possess the most definite characters, differing from each other only in size. Nor is the change by any means uniform for the whole plant; for in some parts two of the joints were observed to be in the green state, while the joint situated between them was free from green matter, and contained the brown bodies; but this might have resulted from the circulation ceasing earlier in the central joint, and, consequently, allowing more time for these changes to take place. It would appear that the enveloping of the granules by an investing membrane, was a means of preserving the organic particles in a green, and, probably, therefore, in a living state. But whether for the purpose of regeneration under a different form, (thus affording an example of equivocal generation), or whether the phenomenon was in any way connected with the reproduction of the plant, did not appear from any observation that I could make, as no further change was observed to take place in the brown bodies, beyond that which has been described, though they were kept in water for a considerable time. An appearance similar to what appears to be the first stage of this process is not unfrequently observed in living *Chara*, where a number of the green granules collect together in a mass, which either passes along with the general circulation, or remains revolving at one extremity of the tube. But I am not aware that the brown bodies now described, have been ever seen in the living plant, nor have I met with any observations which at all illustrate the point. The phenomenon, however, appears to me to bear very closely upon the remarkable form of tissue described by Mr. Bowerbank as occurring in the Herne Bay fossil, and I have therefore been induced to bring it before the Society, together with the original drawings, which were made at the time of the observation, and the preparation of those portions of the plant from which they were made, and which, though it has suffered from being kept for more than five years, during which time it has become dry, will still, I believe, afford a fair idea of the structure alluded to.

These brown globules, contained in the stems of *Nitella*, appear to differ from the globules found in the vessels of the fossil wood, chiefly in the circumstance of their being hollow spheres in the fossil, but capsules filled with green matter in the recent plant.

XIV.—ON THE CLASSIFICATION OF INFUSORIA ACCORDING TO THEIR ORGANIZATION.*

By M. F. Dujardin.

The true INFUSORIA, from which it is but right to separate the *Systolida*, *Rotatoria*, *Bacillaria*, and many other microscopic beings formerly confounded with them, have an irregular form, more or less variable, and essentially *asymmetrical* (deprived of symmetry), thus bringing them near to the spherical or ovoid figure, either by their own contractility, or when vitality ceases.

They may, without ceasing to live, undergo alterations or distortions of the most varied kind, either by injury, partial decomposition, or by some change taking place in the composition of the liquid in which they exist.

Their form and appearance is variable,—sometimes being wrinkled or striated on their surface; they vary in the arrangement of the vibratory cilia, and also in a tendency to the spiral (or coil) form which characterizes exclusively this class, and distinguishes it above all from the *Radiaria*.

The *Infusoria* are produced from unknown germs, in either artificial or natural infusions; and no other mode of propagation is known, or well proved, except that of spontaneous division. The fleshy substance of their bodies is extensible and contractile, like the muscular flesh of the superior animals; but no trace of fibres can positively be observed, and the appearance exhibited is that of membrane having a diaphanous and homogeneous texture. This substance, separable only by the breaking up or death of the animal, forms in the liquid, discs or globules, which slightly refract light, and are susceptible of spontaneously uniting into spherical cavities, analagous in their aspect to the vesicles in the interior.

The vesicles generated in the interior of the Infusoria are destitute of a proper membrane, and are capable of contracting until they nearly disappear, or they settle and become fixed and aggregate. Those taken for *stomachs* are produced at the bottom of a kind of *mouth*; they enclose water filled with food, taking a certain course in the interior without preserving any connection between them or with the mouth. They at length contract and leave, in the midst of a fleshy, glutinous substance, particles not digested, or they evacuate their contents by a

* From the Comptes Rendus, August 19, 1840.

casual opening, which has been erroneously taken for the *anus*. The other vesicles containing only water, are formed nearer to the surface, and appear to admit and expel their contents through the openings (meshes) of a loose contractile integument. They may be considered after Spallanzani, as respiratory organs.

The external organs of motion are *flagelliform filaments*, or vibratory cilia, or fleshy elongations without covering, and which appear all formed of the same living substance, possessing contractility in their whole length. None exist of a horny or epidermal nature, nor secreted by a bulb.

The eggs of Infusoria, their genital organs, their organs of sense, as well as their nerves and vessels, cannot be exactly determined, and all are induced to believe that these animals, although endowed with a degree of organization in relation to their mode of life, cannot have the same system of organs as the superior animals. The coloured spots, generally of a red hue, which are taken for their eggs, for example, cannot receive this denomination with any degree of accuracy.

If, therefore, from these data it is desired to establish a classification for the Infusoria, based on their true and only essential characters, it will at once be seen that the *form*, considered in a general point of view, is sufficient to characterize the true Infusoria as *asymmetrical animals*, separating at first some *symmetrical* and isolated types, having no relation with them; it must be observed, that the shape or figure cannot furnish generic or specific characters of an absolute kind,—the form, for example, contrary to what is observed in the other classes of the animal kind, is nearly always eminently variable. To characterize the orders, families, and genera, it is necessary to have recourse to the presence and position of certain external appendages, which have escaped the notice of ancient micrographers; afterwards completing the generic characters by the mark of some secondary character, taken from the form or some particulars which cannot be expressed with the precision which is proper to Linnæan phrases. As to species, we are compelled to employ to distinguish them, remarks as to size, colour, locality, &c., which are not, however, true *specific* characters in the sense that Linnæus and his followers attached to this word.

According to these principles, the *asymmetrical Infusoria* may be divided into *five orders*, of which the first presents *no special organ* of locomotion—the animals composing it belong exclusively to the family of VIBRIONIDÆ; they are long, filiform, and appear to move slowly by virtue of their general contractility. A second order comprises the three families, AMIBIADÆ, RHIZOPODIDÆ, and ACTINOPHRYADÆ; they are

characterized by the *variable expansions* formed of the substance of the body itself, which by the aid of a proper power, elongates and extends in lobes and filaments, capable by retraction of returning more or less quickly and disappearing in the mass. The extreme slowness of their movements, characterize the latter family; the presence of a head distinguishes the RHIZOPODIDÆ from the AMIBIADÆ, which are naked. A third order takes its distinctive character from *flagelliform filaments*, or from two or more filaments of the same nature serving as organs of locomotion. This order is divided, according to the presence and nature of the tegument, into six families: the first comprises only naked animals, the MONADIADÆ; the two following comprise animals fixed by their teguments, as the VOLVOCIADÆ, agglomerated in a common mass and free; the DINO-BRYADÆ agglomerated, attached by a single point on a frequently immobile branched polyp. The two other families, THECAMODIADÆ and EUGLENIADÆ, include animals provided with a tegument; but in some the tegument is contractile, and the body changes its form incessantly;—in others the tegument is not contractile, and the form is constant. The last family, PERIDINIADÆ, is distinguished by its non-contracting tegument having a furrow furnished with vibratory cilia.

A fourth order comprises the ciliated Infusoria without a contractile tegument; it is divided according to the absence or presence of a row of cilia *en ècharpe ou en moustache*, according to the presence of a mouth and appendages, or cirrhæ, in the form of *styles* or fangs—and, lastly, according to the presence, apparent or real, of a cuirass. The ENCHEYLADÆ, which are the first family of this order, have only scattered cilia and are apparently destitute of an oral opening. The TRICHODIADÆ, the second family, have an evident mouth, marked by a row of cilia. The third family, that of KERONIADÆ, is characterized by the presence of appendages or cirrhæ, in the form of *styles* or fangs. The fourth family, PLOESCONIADÆ, exhibits the appearance of a helmet, which disappears and decomposes, analogous to the living animal. The fifth, on the contrary, ERVILIENIDÆ, is distinguished by a real and permanent helmet.

The fifth and last order, is composed of all the Infusoria higher in their organization, which possess a loose, contractile tegument, marked by regular folds or striæ, or granulations, on its surface, or simply by a regular arrangement and series of vibratory cilia, which, in this case, covers their bodies. The absence of a mouth distinguishes the first family, that of LEUCOPHRYADÆ. Two other families, PARAMECIADÆ and BURSA-RIADÆ, have, on the contrary, a very evident mouth; but in the latter alone, the mouth is provided with a strong row of cilia in *ècharpe* or

spiral. The Infusoria of the last two families are distinguished from the preceding by the circumstance, that instead of swimming freely in the liquid, they are at least temporarily fixed,—such are the URCEOLARIADÆ, which fix themselves voluntarily; the VORTICELLIADÆ swim, attached by their pedicels, and become free only at a certain period, or are always attached.

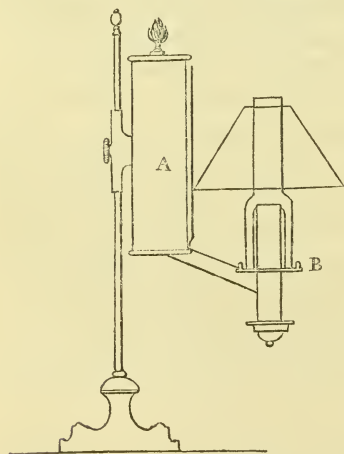
Such are the twenty families, which, apart from the VIBRIONIDÆ, very imperfectly understood, appear to me to rank thus in a manner more natural, and more in conformity with their mutual affinities. They are divided, according to their secondary characters, into about ninety-five genera, as given in a Table which will be inserted in a future number.

Hints to Microscopists.*

I.—ON A CONTRIVANCE FOR EFFECTUALLY BURNING COMMON OIL IN AN ARGAND LAMP, ETC.

By George Gwilt, Esq., F.S.A. &c., &c.

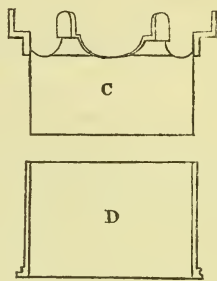
THE great advance in the price of the best spermaceti oil within the last two or three years, has brought forward a number of expedients in the construction of lamps on the one hand, and on the other, in the substitution of oils of lower price; all, however, “*allowed to be equal to the best sperm oil,*” i. e. by the vendors. Few, if any of these, seem to be altogether satisfactory; and after some thirty or forty years’ experience, I still make use of the fountain lamp (fig. A) with which I began, and which if not remarkably ornamental to look upon, is, perhaps, the most useful of any in its application; of course, forms of more elegance may be obtained, to suit the taste of more fastidious purchasers, regardless of expense.



* Under this head we propose to give, from time to time, details of important facts to the microscopic observer, such, at least, as may interest him as connected with the use of his instrument, or the mode of preparing and mounting objects. This paper of Mr. Gwilt's we consider of great importance, as it at once places in the

When the lamp has been properly trimmed and lighted, it must have been observed that in passing the glass chimney over the burner, a maximum of light is obtained by the rapid influx of atmospheric air at a certain elevation of the glass, which subsides as it is lowered down to the rim B, whereon it is usually supported. To adjust and support the glass at that precise degree of elevation which the variable sizes of different glasses may require (thereby producing a very different effect from the usual method, both in the quantity and quality of the light), the simple contrivance, C and D, has been tried, and found to answer the purpose very effectually.

The diagrams C and D, are, perhaps, sufficiently explanatory to shew their construction, as well as their application; but to be a little more explicit, D is the lower portion of a thin brass tube, made to fit in between the bent wires of the burner and the brass rim B, or, in other words, to take the place and position of the chimney glass. C is the upper half of the sliding tube, and should be made with sufficient accuracy to slide or turn round



easily in D, at the same time that it fits closely and firmly; this upper part is provided with six projecting arms, to receive and support the chimney glass. Four of these arms are shewn in the diagram, viz., two in section, and two in elevation; a segmental opening is cut from one arm to the other all round, as well for the free admission of air as to remove all obstruction to the light, which would otherwise take effect. The two tubes being now put together as one tube, and placed in the rim which the glass occupied, and the glass also in its new position, the upper half is raised or lowered to the required height for a maximum of light, and more perfect combustion of the oil.

The diameter of the lower tube is one inch seven-eighths, the diagram being drawn to one half the linear dimension: this size may vary a trifle in different lamps. The difference in the height and diameter of glass chimnies is however much more variable, as was before alluded to, requiring a different adjustment in the different cases respectively;

hands of the microscopist a ready and certain mode of obtaining a good light, at a moderate expense, and renders both the quantity and quality more at control than any means hitherto adopted. We have witnessed the effects produced, and can safely answer for its efficiency —Ed.

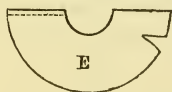
it will be readily perceived how the requisite arrangement is provided for.

To impede the light as little as may be, as well as to improve the general appearance, all the projecting angles of the arms and segments should be chamfered away *from* the light, and all the brass-work of the upper half tube should be bronze colour, as the reflection of the light upon it is so vivid as to produce an unpleasant effect upon the eye. With these precautions, the appearance is rather ornamental than otherwise; in point of economy, a less expensive addition can scarcely be devised.

I trust it will not be out of place to add a word or two respecting the oil. After many trials, I find none burn better or brighter, with less charring of the wick, than the patent cocoa nut oil,* at 4s. 6d. per gallon. It is true, that two objections are generally made to it,—1st, The concrete form it assumes in cold weather; and, 2nd, A rather unpleasant smell emitted when in use. Proximity to the kitchen fire is obviously the remedy for the first of these; and the more perfect combustion produced by using the sliding tubes, very nearly, if not entirely, does away with the latter.

The inner barrel or reservoir of the lamp, A, is seven inches in length, and two inches one-third in diameter, and contains three quarters of a pint of oil. This will burn a little longer than ten hours, and is a sufficient supply, without replenishing, for a very long winter's night; consequently, the cost is but a little more than one halfpenny per hour. I believe the best sperm oil lasted about the same time.

The shade, also, is a very important adjunct. In my opinion, those made of half a sheet of good foolscap paper are unquestionably the best, by striking thereon two semicircles, as in diagram E, the longest diameter



being thirteen inches, and the shorter one four inches, fitting and adapting it to the skeleton-sliding frame as the case may require, and then glueing or pasting the superfluous edges together.

When once properly fitted, another pattern may (previously to the glueing of the edges) be traced out and kept at hand, from which any number may at any time be drawn, and a new shade made when wanted, in less than ten minutes. When it is lowered down a little more than shown in the diagram, the penumbral shadow below is almost wholly dissipated. These shades are much less fatiguing to the eye than the contrast occasioned by an opaque body in juxtaposition with a bright

* Price and Co. of Belmont Place, Vauxhall.

light, also diffusing a more subdued but useful light around the apartment.

I fear I have carried out these observations to a most inordinate extent but a good light is almost as essential as a good microscope ; and as its use and value is not confined to the microscope alone, I trust your indulgence will extend to the time and space I have occupied on the subject, in the hope and expectation that it may be useful to the readers of a journal so likely to promote the advancement of scientific investigation, by such aid and means as that valuable instrument, the microscope, so abundantly affords.

Extracts and Abstracts from Foreign Journals.

[From the *Comptes Rendus*, 1840.]

*On the origin and mode of development of Spermatic Animalculæ.** By M. Lallemand.—M. Lallemand has arrived at some very curious results in consequence of his microscopical researches on the seminal fluid of man, both in a state of health and disease, and on that of mammalia, birds, reptiles, crustacea, and mollusca. These experiments at first sight leading to very different results, so illustrate each other, that M. L. has been able to point out that the different pathological conditions of this fluid in man are observed in all these animals. The following are the most curious of the results at which he has arrived :—

The spermatic animalculæ are the result of secretion, and, like other secreted matters, are susceptible of numerous modifications, and are under the influence of all disturbing causes. Thus they diminish in number, in volume, in density, and in form, during disease ; and their modifications, in this respect, are greater, and their resistance of decomposition less, the more serious the nature of the disease. Sometimes they become very scarce, or are even altogether replaced by pyriform, ovoid, or spherical bodies. These bodies appear to be endowed with life, for they move about with great ease, and after death assume a brilliant lustre. Their form is in general very regular. At the period of puberty these globules precede the appearance of the spermatic animalculæ, and again replace them in old age, and during many diseases. They are, in fact, the results of an incomplete or imperfect secretion.

These alterations in form, size, &c., were also observed to take place in animals at their breeding or rutting seasons, and were especially remarked in birds. In them, the testicles, which are pale, soft, and flabby, during the period of repose, become injected, hardened, and reddened, during the breeding season. They at first contain only a homogeneous and transparent fluid, but which soon becomes filled with granular and then globular bodies. The spermatic animalculæ soon

* From the *Edinb. Med. and Surgical Journ.* April, 1841.

after make their appearance, at first exhibiting but little motion; but afterwards all those signs of life usually observed when fully developed appear. The testicle is then four or five times more voluminous than it was before the sexual period arrived; and the very same phenomena are observed at each sexual period.

In man it is only at the period of puberty that these phenomena are observed, excepting always when they result from the effects of disease.

In the seminal canals the spermatic animalculæ are very numerous, and clustered together in groups, and are not generally quite dry. In all these groups the heads of the animalculæ are directed towards the epididymis, whilst their tails point to the surface of the testicle. When they arrive at the *vas deferens*, they separate and become more mobile. The fluid of the *vesiculæ seminales*, of the glands of Cowper, and the prostate, appear to have no other use than to allow of their moving more easily. In the mollusca the spermatic animalculæ die before the individual. This was especially remarked to occur in the bivalves, which can live for some time out of the water, by keeping their valves closed. This fact is easily ascertained by examining the spermatic fluid immediately after these animals are first taken out of the water, and again before the death of the animal.

These facts appear to authorize the conclusion that spermatic animalculæ are true secretions.

Physiologists show much unwillingness to admit that glands can secrete living bodies, and that, if it were so, the testicle would be the only example. But the ovaries secrete the ovules, which, even before impregnation, are living bodies, which become more perfect in the oviducts after their separation from the ovary, in the same way as the spermatic animalculæ do after their secretion. The ovaries are precisely analogous to the testicle; so much so, indeed, that in the inferior classes of animals it is very difficult to distinguish them from each other. Their position, their colour, the disposition of the oviducts, and of the *vasa deferentia*, are quite similar. This similarity has caused many errors of classification, into which even distinguished naturalists have fallen. But the microscope, by detecting a spermatic animalcule in a body which was generally considered to be an ovary, has corrected many of these errors. Thus Provost discovered that muscles are not hermaphrodite; and Milne Edwards and Lallemand have ascertained the same with regard to the genera *Cypris* and *Patella*. In the *Medusæ*, the similarity between the spermatic animalcules and the ovules is very striking, seeing that the animalculæ are enveloped in true capsules, which may be drawn out from the testicle. In some of the aggregated polypi, the resemblance is very great between the male and female organs. In them the spermatic animalculæ are found between the digestive canal and the walls of the body, having no special organ of secretion, and the ovules are formed in the same situation, there being in them no ovary.

In birds, each group of spermatic animalculæ is half enveloped in a hollow, very thin, and transparent sac, which receives all the heads of that group.

In the crab, the straight canals which represent the testicles contain free spermatic animalculæ; but in the dilated portions of these canals they are found enclosed in capsules with thin walls. The testicles of the Cephalopoda are of a very remarkable construction: there exists in their interior a membrane which is spiral in *Sepia Octopus*, but divided into four distinct compartments in *Sepia officinalis*. The *vas deferens* is besides very long, and spirally twisted; the glans is complex and fleshy. These organs are filled with a great quantity of a viscid fluid. Within the testicles spermatic animalculæ are found exactly similar to the ova—a circumstance which proves that these animalculæ do not come from the capsules. The formation of the spermatophora appears to be easily explicable:—when the spermatic animalculæ arrive at the *vas deferens*, they come in contact with the surrounding viscous fluid, which forms a capsule or envelope over them, simple when the organs are simple, and double when they are double. When the liquid found in these canals is aqueous, the animalculæ move about with freedom.

The capsules have a great affinity for water, which penetrates them by endosmose, and bursts them when they are simple. When there are two membranes, the outer one cracks, and allows a long prolongation from the internal membrane to project through it. The movements of the ova of the Cephalopoda are not produced by muscular action, but in consequence of this endosmose.

The compound ova of many of the leeches, planariæ, and Cephalopoda, are formed in the same manner, and exhibit still further the close resemblance between the ovule and the spermatic animalculæ.

In the testicles of the snake small brilliant bodies are met with, which become elongated in form when they reach the epididymis, and in the *vas deferens* acquire a tail. Thus it appears that in these animals it is easy to trace the development of the spermatic animalculæ at its different periods of growth. These brilliant bodies are thus proved to be but the rudiments of the spermatic animalculæ, around which, first a head, and then a tail appear. They are to the spermatic animalculæ what the vesicle of Purkinje is to the ovule.

M. de Lignerolles announced to the Academy of Sciences, Paris, that he had discovered a new process for injecting the *tubuli seminiferi*, and requested that a committee be appointed to report on the results obtained by this new means.—8th March, 1841.

M. Ch. Chevalier, on the occasion of a communication recently made to the Academy, on a microscope of small dimensions, stated, that in his *Manuel de Micrographie*, 1839, he has given a description of an instrument, measuring four centimetres in length, possessing a magnifying power of 500 times.—8th March, 1841.

M. Ch. Chevalier made some remarks also on the Stanhope lens, and detailed the following as some of its inconveniences:—

1. The focus not being capable of adjustment, two individuals of different sight cannot make use of the same instrument:

2. As the object to be examined is fixed to the lens, it is requisite, on its removal, to rub the lens, in order to remove any adherent matter, and which, on account of the repeated friction, will soon be found scratched and unfit for use :
3. The magnifying power of this lens is too small to allow of its employment in a great number of instances, in which it would be exceedingly useful, on account of its great portability.

These disadvantages M. Chevalier has remedied, by employing a doublet, furnished with a very thin piece of glass, which is fixed in front of the lenses, in a ring (*barillet*), and put in motion by a very simple piece of mechanism. The instrument, supplied with this arrangement, may be adjusted to the focus of the operators, and is not so likely to be affected by the causes above mentioned.

M. *Lerebours*, at the sitting of the 29th March, 1841, made some remarks on M. Chevalier's objections to the use of the Stanhope lens, as above quoted. The *first* inconvenience exists, as M. L. asserts, in theory, *but only in the most near-sighted individuals*; and in support of this opinion he states, that he has never met with a person who saw indistinctly with Stanhope lenses. To the *second* objection M. L. cannot see how the surface of the Stanhope lens becomes more scratched than the lamina of very thin glass used by M. Chevalier. *Thirdly*, The Stanhope lenses usually magnify 40 times; he has however made them with a magnifying power of 80 diameters. According to the experience of micrographers, excessive enlargement is rather an inconvenience than an advantage, above all, in instruments intended for excursions. He further adds, that M. Chevalier, in detailing what appear to him as imperfections in the Stanhope lens, has omitted to speak of its advantages. Thus, he says nothing as regards the extent of field afforded by this lens, which amounts to 35 degrees, while Wollaston's Doublet, which he uses, scarcely has a field of 15 degrees, and cost four times the money.

[*Revue Zoologique*, Nov. 1840.]

Observations on the mode of formation and development of Zoosperms in the Batrachians.—In the interesting memoir of M. *Lallemand*, read to the Academy of Sciences in November 1840, on the question of the production and alterations that zoosperms undergo under certain circumstances, M. *Pelletier* states, that in 1834, at the Society of Natural Sciences, and on the 31st March 1838, at the Philomatic Society, he communicated the results of his labours and observations on the zoosperms of the frog, an abstract of which was printed in the April number (1838) of the *Journal of the Institute*, p. 132. He describes in this note a kind of globule, differing from that of the blood, in the testicles of young frogs. These globules are spherical, and undergo particular changes. According as the young frogs approach the adult state, and the period of copulation, these round globules may be seen

to become pointed, and subsequently more deeply indented. The extremities assume an elongated character, and adhere to each other; they form a striated cone, which increases much in size at the period of copulation. These striæ soon separate, and present the globule surmounted by a vessel with oscillating filaments, which is in fact a mass of zoosperms still attached by their heads, their extremities only being free. In a short time they may be seen to detach themselves, one after the other, and to abandon the punctuated globule. He has in addition shown the formations of the animalcules, which passing, by intermediate degrees, at length assume the form of a ciliated *cupel** before death stops their progress. These transformations become more rare as we ascend the scale of the animal creation.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

April 28th, 1841.—Richard Owen, Esq., F.R.S., President, in the Chair.

Dr. J. Lee, and Messrs. T. L. Wheeler, and H. H. White, were elected members.

A paper was then read by Dr. Arthur Farre, entitled “On the minute Anatomy of the Larva of *Anthomyia caniculata* of Meyen,” (an abstract of which will appear in the next number.) An animated discussion followed the reading of this paper, in which Messrs. Owen, Bowerbank, Varley, Sir Oswald Mosely, and others, took part; and during which various opinions were elicited as to the modes by which this parasite might have obtained entrance into the human body.

Mr. Bowerbank made some verbal observations “On the Generation of Sponges,” detailing some new facts he had recently discovered when examining the structure of Agates.

Mr. Jackson exhibited to the meeting a Portable Candle Lamp for Microscopists, which burns the candle without wicks, as manufactured by Molyneux. The Society then resolved into the conversazione and examination of objects.

Microscopical Memoranda.

On a method of Illuminating Microscopic Objects.—Considering a perfect microscope as consisting of two parts, viz., an illuminating apparatus, and a magnifying apparatus, Sir D. Brewster states, that it is of more consequence that the illuminating apparatus should be perfect, than that the magnifying one should be so; and that the essential part of his method consists in this:—that the rays which form the illuminating image or disc shall have their foci exactly on the part of the microscopic object to be observed, so that the illuminating rays may radiate as it were from the object, as if it were luminous. Now this can only be well attained by illuminating with a single lens, or a system of lenses, without spherical or chromatic aberration, whose focal length,

* Cupel, a vessel used for assaying.

either real or equivalent, is less than the focal length of the object-glass of the microscope. The smaller the focal length of the illuminating lens, or system of lenses, the more completely do we secure the condition that the illuminating rays shall not come to a focus, either before they reached the object, or after they have passed it. When Dr. Woollaston recommended for an illuminating lens, one of three-fourths of an inch in focal length, in which the microscopic object was placed in a vortex of foci, where the rays crossed in a thousand points, both before and after they fell upon the object, he could have had no idea of the new method of illumination. In the construction of a perfect microscope, Sir D. Brewster recommends that the illuminating and magnifying apparatus should have separate and similar movements along the same rod or bar, and that the stage for the objects should be unconnected with either, and should have also a motion independent of both.—*Rep. Brit. Assoc.* 1840.

On the Berg-Meal from Swedish Lapland.—Dr. Trail gave an account, at the Roy. Soc. Edin., of the composition of a substance brought, under the name of *Berg-Meal*, from Swedish Lapland, by Mr. Laing, in 1838. It was found under a bed of decayed mosses, forty miles above Degersfors, in Umea Lapmark. When examined by the microscope, it was found to consist of several species of minute organic remains, which Ehrenberg has considered as the silicious skeletons of infusoria. The largest measured from 0.006 to 0.0005 of an inch. On analysis, Dr. T. obtained 22 per cent. of organic matter, entirely destructible by a red heat; and he found the snow-white residue, which still retained the microscopic forms to consist of 71.13 of silica, 5.31 alumina, and 0.15 oxide of iron. He considers the organic matter and the silica as the essential ingredients, and the others probably as accidental. As a mixture with food, the quantity of organic matter in the *Berg-Meal* gives it a preference over the steatites and clays used for a similar purpose by some rude tribes.—*Proc. Roy. Soc. Edin.*, 18th Jan. 1841.

The Electrical Organs of the Torpedo.—A paper, entitled, "Miscellaneous Observations on the Torpedo," by John Davy, M. D., was read at a meeting of the Royal Society, on 4th March, 1841. The experiments described in this paper were made on a single fish, of middle size, recently taken out of the water. Portions of the electrical organs, cut transversely in thin slices, exhibited, under the microscope, many elliptical particles, apparently blood corpuscles, the long diameter of which was about 1-800th, and the short about 1-1000th part of an inch, and a few filaments, apparently nervous, irregularly scattered—some of them tortuous, and all of them about the 2000th of an inch in diameter. The latter bore no resemblance to muscular fibres. The blood contained some globular particles, having the diameter of the 4000th of an inch, mixed with the elliptical. The mucus for lubricating the surface, was found to contain globules apparently homogeneous in substance, but of irregular outline, and in size varying from the 2000th to the 270th of an inch.—*Athenæum*.

XV.—OBSERVATIONS ON THE BLOOD DISCS AND THEIR CONTENTS.*

By John Quekett, Esq., M.R.C.S., &c.

THE author, after briefly alluding to the great importance of the blood in the animal economy, and to the erroneous opinions which had been entertained respecting its globules or discs, then proceeded to state, that in his frequent examinations of the blood of the human subject, he has often been attracted by the curiously corrugated or mulberry-like appearance which many of the discs presented, and at first he attributed this change in form to the salt and water which had been used to dilute them with, previous to examination. The fluid consisted of five grains of salt to an ounce of water; whenever this was added to recent blood, the discs very soon assumed this mulberry-like character. The first effect produced on the addition of the saline solution was that of the discs becoming stellate; little points appeared first on their edges, and subsequently on their flattened surfaces as well, and after a time these points become rounded, and eventually each disc assumed a mulberry-like appearance, which gave him the idea of their containing small globules or granules in their interior, as ultimately proved to be the case. On one occasion, whilst examining some blood which had been diluted with salt and water, and having been prevented from watching it for a few minutes, he was surprised at the great number of small granules which had made their appearance during this interval, which led him to suppose, that these granules might have escaped from some of the red discs, and therefore watched to ascertain whether such was the case. After viewing them for some minutes, he distinctly saw for the first time, one or two of these little bodies escape suddenly from the interior of one of the discs, and this soon after was followed by a second, then a third, and so on, until six or seven had escaped. Numerous opportunities having since offered of verifying these observations, it has been found that from most of the discs six or seven of these little granules escape, some being emitted suddenly from the parent disc, whilst others merely make their escape at the edge, and there remain, giving the disc a beaded margin, whilst those, on the contrary, which were projected to some little distance from the parent, moved about the field

* Read before the Medico-Chirurgical Society of London, March 23rd, 1841, and abstracted by the author.

of view as if they were animated, which fact will be again alluded to. It was subsequently found, that those discs which had given off these little granules from their interior, disappeared from the field of view, not suddenly bursting, but gradually getting more and more transparent, till no trace whatever of them was to be seen which was attributed to the solvent power of the salt and water.

Having proceeded thus far in his observations on the blood diluted with salt and water, his next endeavour was to prove whether these changes in any way depended upon the saline solution, and whether the same phenomena would occur in blood fresh drawn from the body, having no other fluid for the red discs to float in than its own *liquor sanguinis*: accordingly, some blood was taken from a small incision in his arm, and placed on a glass, and covered lightly with a thin piece of mica. At first no trace of spinous discs was to be observed; but after a few minutes they sprang up in all parts of the field of view, but their surfaces were not so much corrugated as when the saline solution was used, neither did the change from the ordinary disc to the spinous one go on so rapidly; but all the other phenomena were precisely similar to those which took place in the blood treated with salt and water.

By access to the splendid library of the Royal College of Surgeons, he has been enabled to ascertain what had been done by others; and it is curious to remark, how beautifully some of the observations of the oldest examiners of the blood can be confirmed and explained by what he has himself witnessed; and he likewise has found, that many things known and described by them, have been entirely overlooked by writers of modern date. Leuwenhoeck states, that each disc was composed of six smaller ones. Hewson knew that the discs sometimes assumed a mulberry character, and that the discs of the blood of the eel would sometimes split and allow the nucleus to escape; but he attributed these changes to putrefaction, and states, that human blood discs will become corrugated, and appear like mulberries when putrid serum is added to them. From this time down to within the last two or three years, these appearances have been nearly overlooked. Professor Schultz must have witnessed the escape of the granules from the red discs, but calls them air bubbles; he states, that the powerful contraction of the vesicular membrane, excited by the salt and water, caused the elastic fluid contained in the vesicles to be pressed out, and to escape in the form of air-bubbles,—his idea being, that a gas was contained in the interior of the vesicle around the nucleus. It has been stated in the preceding part of this paper, that some of the little granules, after their escape from the parent,

would take on a molecular movement. This fact must also have been noticed by Majendie, for in his *Lectures on the Blood*, published in the *Lancet* for 1838-39, he states, "that when blood was kept for 24 or 36 hours, the discs became puckered up, and besides this, a number of Vibriones or Monades appeared at the same time in the serum, which devour the red globules." Others have made mention of the corrugated discs, and of the little granules; but all have singularly failed in ascertaining their nature or their source; they have been described by authors under the names of lymph, chyle, and fibrin globules. Besides these and the red discs, other bodies are seen in the blood, which are much larger than the ordinary discs, and have been described by some observers as pus globules; whether so or not, they give off granules from their interior, but without becoming first spinous, like the red discs. The changes described have been found to take place more rapidly in the blood of some individuals than in that of others, and in the same individual at different times, the best subjects being those of an inflammatory habit of body. There is one essential thing to be borne in mind, which is, that the blood must not have been suffered to coagulate before examination; when this has commenced, and the discs have become aggregated together like piles of money, the changes before described will not take place. From the repeated observations of the author he arrives at the following conclusions:—That each red particle of human blood is a flattened circular disc, consisting of an outer membrane or envelope, with a thick gelatiniform fluid in its interior, which, under certain circumstances hereafter to be noticed, is capable of becoming granular, and of escaping from the envelope in the form of small globules, the general number being about six or seven for each disc: also, that the discs may present either a bi-convex or bi-concave figure, of which the latter form is by far the most numerous, which is in a great measure dependant upon the quantity of the gelatiniform fluid which they contain in their interior. The existence of a nucleus, as described by Hewson, Müller, and other observers, he has entirely failed in making out. At present he declines stating what he has ascertained these little granules (so often spoken of) to be; these, together with the important part they play in some of the effects of inflammation, as well as some other properties of the blood, will form the subject of another paper, which he hopes shortly to lay before the Society.

NOTICE OF THE RESULT OF AN EXPERIMENTAL OBSERVATION MADE
REGARDING EQUIVOCAL GENERATION.*

By F. Schulze of Berlin.

SINCE the question respecting *generatio æquivoca* has attracted the attention of naturalists, the developement of living organisms has never been observed in vessels from which all air had been expelled by boiling, and which had been hermetically sealed. The access of air has been regarded as a necessary condition for the primary formation of Infusoria from decomposing organic matter, so that the mere circumstance of covering an infusion with a stratum of oil, removed that condition. But the question still remained undecided,—If the access of atmospheric air, light, and heat to *infundirten* substances included of itself all the conditions for the primary formation of animal or of vegetable organisms? And, in this point of view new direct experiments were considered to be very desirable. The difficulty to be overcome, consisted in the necessity of being assured, first, that at the beginning of the experiments there was no animal germ capable of developement in the infusion; and secondly, that the air admitted contained nothing of the kind.

I filled a glass flask half full of distilled water, in which I mixed various animal and vegetable substances; I then closed it with a good cork, through which I passed two glass tubes bent at right angles, the whole being air-tight. It was next placed in a sand-bath, and heated until the water boiled violently, and thus all parts had reached a temperature of 212 F. While the watery vapour was escaping by the glass tubes, I fastened at each end an apparatus which chemists employ for collecting carbonic acid; that to the left was filled with concentrated sulphuric acid, and the other with a solution of potash. By means of the boiling heat everything living, and all germs in the flask or in the tubes, were destroyed, and all access was cut off by the sulphuric acid on the one side, and by the potash on the other. I placed this easily-moved apparatus before my window, where it was exposed to the action of light, and also, as I performed my experiments during the summer, to that of heat. At the same time I placed near it an open vessel with the same substances that had been introduced into the flask, and also after having subjected them to a boiling temperature. In order now to renew constantly the air within the flask, I sucked with my mouth, several times a day, the open end of the apparatus filled with

* From Jameson's Journal, Vol. 23.

solution of potash; by which process the air entered my mouth from the flask through the caustic liquid, and the atmospheric air from without entered the flask through the sulphuric acid. The air was of course not at all altered in its composition by passing through the sulphuric acid in the flask, but if sufficient time was allowed for the passage, all the portions of living matter, or of matter capable of becoming animated, were taken up by the sulphuric acid and destroyed. From the 28th of May till the beginning of August, I continued uninterruptedly the renewal of the air in the flask, without being able, by the aid of the microscope, to perceive any living animal or vegetable substance, although during the whole of the time I made my observations almost daily on the edge of the liquid; and when at last I separated the different parts of the apparatus, I could not find in the whole liquid the slightest trace of infusoria, of confervæ, or of mould. But all the three presented themselves in great abundance a few days after I had left the flask standing open. The vessel which I placed near the apparatus contained on the following day *Vibriones* and *Monades*, to which were soon added larger Polygastric Infusoria, and afterwards *Rotatoria*.

XVII.—ON THE DEVELOPMENT OF THE VASCULAR TISSUE OF PLANTS.*

By E. J. Quekett, Esq. F.L.S., &c.

IN these observations it was shown that the membranous tube which forms the parietes of vessels, originates from a cytoblast or nucleus, in a manner similar to that described by Schleiden, in the formation of ordinary cells of a plant, from which, at first, it is difficult to recognise them; but in a short period they assume the usual elongated cylindrical form, and the cytoblast becomes absorbed.

Immediately after this state, and before the fibre becomes deposited, the contents of the young vessel, which appear to be gelatinous, become charged with innumerable granules, so small as not to allow light to be transmitted through them—looking as blackish dots, and just visible under very high magnifying powers. These granules possess the motion known as “active molecules,” and after a short time, when they have become a little enlarged, they begin to adhere to the

* Abstract of a paper read before the Microscopical Society of London, February 19th, 1840.

inner surface of the cylindrical cell containing them; and it appears that this direction can be in most instances resolved into the spiral form, even in those vessels in which when the fibre is perfect that form is lost from changes that have occurred since the primary deposit of the granules.*

The singular law of the spiral arrangement of the granules was mentioned as deserving some attention, being sometimes arranged in the direction of a right-handed screw—in other cases in the opposite manner; sometimes in a single screw—in others as a compound one; many fibres running to constitute the helix. It was considered not improbable that these granules possessed certain polarities, and that also the usual continued passage of electrical currents through the axis and branches of a plant may possess the power of determining the linear and spiral order of floating granules, somewhat as the electrifying of the particles of gold-leaf mixed with water causes them to assume a linear condition; but there can be no doubt that much in this matter is effected by the agency of the vital powers of the cell itself, controlled by the influence of the plant.

It had been conjectured by Schleiden (whose observations the paper was intended in a great measure to confirm) that a current existed between the gelatinous contents of the vessel and its wall, which preceded the formation of the fibre within, and gave to it the direction it afterwards took. This opinion was shewn to be not altogether correct, by the fact that the granules become separately attached to the inside of the vessel without any discernible distance from each other, beginning first at one end and proceeding gradually to the other; occasionally a vessel being found, in which part had the granules laid down in the spiral direction, and the other as yet without any adhering to the membrane,—the fibre elongating like a root by the materials for its increase being added always to the growing point.

The granules so attached, becoming nourished by the contents of the vessel, have the moniliform appearance they first present in a short

* The author, at the period of reading this paper, had examined several specimens of plants in which it appeared that the spiral form was not peculiar to all, and that the granules were sometimes deposited at the commencement in the manner in which the fibre was found ultimately to obtain. This induced him to mention in the original paper, that each vessel had a peculiar arrangement of the granules for itself; but subsequent observations have led him to believe, that the spiral form more or less perfect is the type of all, which opinion is entertained by other vegetable anatomists.

period obliterated, and the fibre thereby obtaining a clear border which completes its development.

This act is one which is believed to be met with in all vessels at their origin, but is frequently modified in certain vessels afterwards—viz., in the *annular vessel*, according to Mohl, the rings of fibre in this vessel are formed by the union of one coil or coils of the fibre, in its early condition, and afterwards separating from the others, or adhering and becoming perfect rings in the interior of the vessel. In the *reticulated*, on various portions of the original spiral fibre, a granule becomes enlarged in the line, and forms the starting point for a branch of fibre, which connects the turns of the spiral together, in various portions, and in various directions. In the *dotted* and *scalariform* vessels, the fibres become so connected as to leave meshes or portions of the membranous wall of the vessel without any deposit within—and this spot so left, constitutes the *dot* in the former, and the *linear marking* seen on the walls of the latter. This dot is plain in all such kind of vessels, excepting those found in woody Exogens, where it possesses (from some slight difference of structure) a central mark, making it analogous to that on the woody tissue of coniferous plants, with which the author thought it identical in structure, and probably in function, but only of a smaller size.

The paper was illustrated with numerous diagrams representing the successive stages of the minute process described.

XVIII.—ON THE STRUCTURE OF THE MACULA LUTEA OF THE HUMAN EYE.*

By Dr. Grube of Königsberg.

THE yellow spot in the human eye is situated on that precise point of the retina which answers to the posterior point of the axis of the eye, and is, therefore, the only part of the retina in which the eye perceives with perfect distinctness (in *direct* vision) the figures represented on it; since the remaining surface serves, as is well known, only for very imperfect (*indirect*) vision. Of the structure of this yellow portion, which is so much more delicate than the rest of the retina, that, from its susceptibility of injury, it was for a long time conceived to be perforated, I have no precise knowledge. I have often examined it in the

* From Müller's Archiv. fur Anatomie und Physiologie, Heft 1, p. 38, 1840.

Translated by Mr. G. F. Richardson

most fresh state I could select, with a power of three hundred linear, but could never arrive at a satisfactory result; and, indeed, I usually found the structure of the retina in the human eye, to be far less distinctly recognizable than in the eyes of animals recently killed. This indistinctness of the objects I conceived to be attributable to the decomposition which so speedily attacks the eye, since, in animals also which have been two days dead, the structure of the retina is no longer distinctly to be seen. The eye is decidedly that part of the body in which traces of incipient decomposition first display themselves; the cornea in a few hours after death acquires a folded aspect, and the eye appears as if it had lost a great part of its humidity.

I recently had the opportunity, through the kindness of the Counsellor of Medicine, von Treyden, to examine the eye of a man who had died a few hours before of rupture of the spleen;—the results of this investigation were so decisive as to afford me the greatest possible surprise.

The retina adhered so firmly to the vitreous humour, that it was impossible to separate at least the greater portion of the latter, except by actual cutting with scissors; while, it is well known that soon after death a fluid usually collects between the retina and the hyaloid membrane, which renders the removal of the vitreous humour from the retina extremely easy. It was already perceptible to the naked eye, that the place of the yellow spot arose in a conical form, considerably above the surface of the retina. The size of this elevation I was unable to measure distinctly. I was, however, enabled, with a magnifying power of three hundred linear, to perform one entire turn of the screw of the micrometer, in order alternately to bring into focus the highest point of the yellow spot, and the surface of the retina lying beneath it.

With the view of preserving the object as entire as possible, I did not compress it strongly, but placed over it a very thin plate of glass a quarter of an inch in size, in order to level the conical elevation. The appearance which the yellow spot now presented most nearly resembled the shagreen formerly used by stationers for the covers of cases, &c. Elongated, rounded particles, gradually tapering towards the middle, and about one-fourth or one-fifth the size of particles of marrow (markkör-perchen), arranged themselves together with great regularity on the remainder of the surface of the retina. They proceeded like radii towards the periphery of the yellow spot, became larger at that point, but less distant in their outline, and with them were associated the marrow-like particles of the remainder of the retina, in gradual transi-

tion. This point of transition (the circumference of the yellow spot) was not circular, but the marrow-like globules radiated rather farther in a star-like form at single points, which were not situated at regularly recurring distances. A complete measurement I was unable to effect.

I had the opportunity of submitting this observation to the Physician General, Dr. Linden, who expressed himself perfectly assured of its correctness. It appears to me to be so far important that it affords the means of a simple and mechanical explanation of the phenomenon, that a portion only of the retina, namely, that which answers to the posterior part of the axis of the eye, possesses the power of distinct vision.

Hints to Microscopists.

II.—ON THE CULTIVATION OF VALISNERIA, CHARA, ETC., FOR MICROSCOPIC PURPOSES.*

By Cornelius Varley, Esq.

I OFFER the following remarks as the result of my experience to those microscopists desirous of preserving the different *Charas*, *Valisneria*, and *Hydrocharis*, or Frog bit; in all of which the circulation may be well observed.

In cultivating these plants, it is only requisite to take notice of the circumstances under which *Chara* naturally thrives, and to imitate them as nearly as practicable.

Firstly. The *Chara* tribe is most abundant in still waters or ponds that never become quite dry; if found in running water, it is mostly met with out of the current, in holes or side bays, where the stream has little effect, and never on any prominence exposed to the current. If the *Chara* could bear a current, its fruit would mostly be carried on and be deposited in holes; but it sends out from its various joints very fine long roots into the water, and these would by agitation be destroyed, and then the plant decays; for although it may grow long before roots are formed, yet when they are produced, their destruction involves the death of the plant. In order, therefore, to preserve *Chara*, every care must be taken to imitate the stillness of the water, by never shaking or suddenly turning the vessel. It is also important that the *Chara* should be disturbed as little as possible, and, if requisite, it must be done in the

* In a letter to the Editor.

most gentle manner, as, for instance, in cutting off a specimen, or causing it to descend in order to keep the summit of the plant below the surface of the water.

Secondly. Imitate the freshness of the water, by having an extent of surface, which it is requisite to skim frequently, or suffer it to overflow by the addition of more water. These precautions being attended to, a clear bright surface is kept. It is also desirable to change a small portion of the water; but this should be done without agitation. The best vessels for cultivating this plant in, are either wide pans, holding three or four gallons, or glass jars a foot or more high; into these the Chara may be placed, either with clean water alone, or a little earth may be sprinkled over it, so as to keep it at the bottom, or the bottom may be covered one inch with closely pressed mould, in order that the water may be put in without disturbing it. On this lay the Chara, with a little earth over the lower ends, to fix it. By causing the water to overflow is the readiest way to skim the surface, though dipping out gently will do; but in all cases of pouring in water, hold something, such as a saucer or flat piece of wood, to receive the pouring, and make it spread instead of allowing it to descend at once on the surface. Pans in the open air, nearly full of water, will be kept in order by the wind and rain, only taking care to supply the deficiency, (the effect of evaporation) and to change some of the water, if it be considered necessary. The vessels kept in-doors have a film which is always forming on the water, and which requires to be frequently removed.

Thirdly. Imitate the equal temperature of its native holes, by sinking the pan a little within the earth; but, during frosty weather, keep the pan in-doors, and at the lower part of the house, as this situation is generally the most uniform in its temperature.

The Chara will live in any temperature above freezing, and grows quicker as the warmth increases; but above the earth, as outside of a first-floor window, it will not bear the daily difference between the mid-day sun and the cold of sun-rising.

The glass jars I keep within the house, as nearly uniform in warmth as convenient.

Similar care is requisite for Valisneria, but the warmest and most equal temperature is better suited to this plant. It should be planted in the middle of the jar in about two inches deep of mould, which has been closely pressed; over this, place two or three handful of leaves, then gently fill the jar with water. When the water requires to be changed, a small portion is sufficient to change at a time. It appears to thrive in proportion to the frequency of the changing of the water,

taking care that the water added rather increases the temperature than lowers it.

The natural habitat of the Frog-bit is on the surface of ponds and ditches ; in the autumn its seeds fall, and become buried in the mud at the bottom during the winter ; in the spring these plants rise to the surface, produce flowers, and grow to their full size during summer. In order to keep them for microscopic purposes, large pans, with earth at the bottom, will preserve them through the winter ; and if left out of doors during the cold months, the pans should be sunk into the ground to preserve the buds from the extreme cold.

Extracts and Abstracts from Foreign Journals.

[From *Oken's Isis*, 1839.]

Mandl has discovered a new spermatic animalcule in man. It has a knot-like ganglion behind the head, while others seem to resemble the spermatic animalcules of the mouse. The seminal fluid was probably vitiated by indisposition.

Doyère observes as follows on an animalcule found in the sand procured from gutters in the roofs of houses, forwarded to him by *Schulze* :—It is not *Macrobiotus hufelandi*, though in some particulars it much resembles that animalcule ; he however considers it to be the same in more advanced age, and to be identical with *Spallanzani's Tardigradus*, not so long but thicker than *Macrobiotus* (280,012 mill. meter) ; it has a somewhat substantial and red-brown skin, and a head with two obvious pairs of appendages like antennæ. The body consists of four rings, each having a pair of feet attached, and three rings, with a pair of long threads or spines on the upper ring. The feet are jointed, and have four equal claws—not two divided ones like *Macrobiotus*. The proboscis is protrusible, and consists of three portions ; the points of the jaws are not bent but straight.

Among the same sand were many smaller individuals of *Macrobiotus*, probably younger ones ; they had only three claws on the feet, of which two were simple and one divided. This is probably the *Trionychium* of *Ehrenberg*.

Turpin states that in the yeast of beer the so-termed slime actually consists of small Fungi, in a state of vegetation, including *Mycoderma* (*Hygocrocis*) *cerevisiæ*, *Torula cerevisiæ*. Fermentation is a kind of vegetation of these plants in water.*

Morren on the structure of *Agaricus epixylon* :—The colouring matter presents characters different from those of the flowering plants. There is no skin on the covering of the Fungi. The tissue is similar to that of flesh, and consists of a net of long transparent vessels, which, on

* A translation of *Turpin's* paper will be inserted entire in a future number.—Ed.

the whole, appear altogether of a full blue colour, but under the microscope present only here and there blue globules, $\frac{1}{300}$ th of a millimetre in size. They are not altered by death. The fungi cannot, therefore, be reckoned among cellular plants.

In *Agaricus epixylon* there are no single cells. The tissue consists of anastomosing vessels, commonly furcated, occasionally three cornered—sometimes jointed, with young branches proceeding from the joints. The tubes are often united by a cross band like the letter H. The *vasa laticifera* most nearly resemble these. This structure is common to all Fungi. Thus it is a regular branched vascular structure.

The *vasa laticifera* are simple elementary organs which form together the circulating apparatus of plants. The tissue of the Fungi is distinguished by the felt-like structure, and by the want of circulation, at least during great part of their existence, as well as by the minute globules in the fluid. This last fact is characteristic of the Fungi.

Milne Edwards on the Breathing Organs of Oniscus and Tylos.—In the latter of these, the large transverse foliaceous appendages of the abdominal feet, have on the lower side a series of eight or nine air-holes, through which the air passes into as many small organs of breathing, which lie in the long foliaceous vesicles, the surface of which is full of tubular and ramose elongations. These float in the chyle of the animal, and assume an intermediate form between the respiratory organs of the spider and the air-tubes of the carp. In *Oniscus* and *Porcellio*, the anterior leaves of the first two pair of abdominal feet, have several irregular apertures beneath the hinder margin, observed by Latreille, respecting which Edwards has shown, that the air penetrates through them to a branched organ in the interior of the appendage, as in *Tylos*. A classification of the crustacea, founded on their respiratory organs, would, therefore, not be natural.

[From *Valentin's Repertorium*, 1840.]

Stiebel on Lysogonium tanioides.—This creature, found by Stiebel in the deposit of certain mineral springs, is thus described by him:—It appears under the microscope as a very long articulated body, enveloped by a mucoid or transparent covering, the articulated portions being connected together by a straight band or muscle running along on both sides. Each portion is divided by a transverse canal, running between and below the mucoid envelope, and which has a small opening close to the straight muscle before-mentioned. The extremities of the body are oval-shaped, and the creatures are aggregated in bundles, adhering together by means of a sort of slime. Sometimes one of the bodies projects beyond the mass, or moves in an oscillating manner. At its anterior extremity (which contains less granular matter), a distinct articulated head is seen, having a dark notch laterally, which is the mouth; this opening, when viewed dorsally, as it were, appears triangular, and from which a proboscis is sometimes seen to emerge. A delicate triangular appendage or *feeler*, is seen projecting on each side (or

even two on each side), especially on the smaller creatures, which consist of only one or two articulated pieces. The proboscis is provided with muscles, proceeding from the main lateral ones, and both at the anterior and posterior extremities of the body, placed upon small pedicels, to which a delicate black nerve is seen running, black eyes are visible. Each articulated portion is round, and provided with a black, often zig-zag formed nervous fibre, and contains vesicles and granules of various sizes. A black stomach and delicate intestine is also to be found. Propagation is effected by self-division or separation of the articulated portions.

Nasse on the Nerves of Frogs—The appearance of the nerves of a frog, which had been kept for a whole year without nourishment, and in which emaciation was considerable, was quite normal. The fibres of the ischiatic gave, as the ratio of thirty-six measurements, 0,000367". In a healthy frog, the ratio of thirty measurements of the fibre of the ischiatic, was 0,000374".

Fricke has observed species of *Acephalocystus* in the bones of the Pelvis of a man sixty years of age. *Estlin* species of *Cysticæcus* between the conjunctival and sclerotic coats of a girl six years old; and *Gervais* makes mention of an *Echinococcus* being found in a Simia.

Glüge has examined, microscopically, *ramollissement* of the brain. According to him, in that kind of *ramollissement* where the softened portion is devoid of colour, and which is comparatively rare, the primitive nervous fibres are broken up, and contain sometimes a small quantity of pus, and fewer of the small bodies or granules which are observed in the *red* softening. These last are considered by Glüge as analogous to what he calls his *globules of inflammation*; whilst *Valentin* looks upon them as approaching to the particles of the general pigment of the body, though, nevertheless, differing from them. According to Glüge they can be demonstrated within the capillary vessels of the substance of the brain itself. Extravasation of blood may cause, *ramollissement* in two ways,—first, in a purely mechanical manner, and secondly, by the absorption of its coloured serum.

[From the *Revue Zoologique*, 1840.]

Bourjot on the Structure of the Eye of Hirudineæ.—At the Philomatic Society of Paris, 26th March, 1840, M. Bourjot endeavoured to prove that the structure of the eye in Hirudineæ, is complete, inasmuch as it consists of a choroid coat and a perfectly round crystalline lens, as is the case in all animals which live in water. Thus, contrary to the opinion of M. de Blainville, and the doubt expressed by M. Moquin-Tendon, in the Monograph of Hirudineæ, M. Bourjot establishes, that the eyes of the common *Nephelis*, and of *Clepsina punctata*, which approaches near to Planaria, and with greater reason to the higher order Hirudineæ, have eyes appropriately adapted for vision.—p. 120.

Milne Edwards on the Spermatophora of Cephalopods.—The spermatophora are bodies discovered by Swammerdam and Needman in the male organs of Cephalopods, and which, when they are removed from the membranous pouch where they are arranged side by side, exercise some degree of motion, change their form and soon burst. M. M. Edwards and Peters have observed them in several Cephalopods, and give, as the result of their researches on these singular bodies filled with spermatific animalcules, that they are instruments of fecundation of a new description altogether, having their analogues in the fecundating corpuscles of the grains of the pollen of plants, which burst when they come in contact with the female organ (stigma) of the flower.—p. 153.

Guillot on the Acephalocysts of the human body.—At the Philomatic Society of Paris, June 13, 1840, M. Natalis Guillot, made known the results of his observations on these bodies. He explained the development of vessels on their walls, their communication with the neighbouring parts, and the transformation of the *Acephalocysts*, into *true cysts*, provided with vascular parietes.—p. 180.

Laurent's researches on Spongilla fluviatilis.—At the Philomatic Society of Paris, June 19, 1840, he endeavoured to prove that four kinds of reproductive organs existed in this species, viz.:—1. *Oviform bodies*, already known, ejecting a glutinous substance they contain, and in which no silicious spicula are found at the moment of expulsion from the egg.—2. *Gemmiform bodies*, very imperfectly known in *Spongilla*, called by Dr. Grant *ovules* (in sponges) which, at the moment they detach themselves from the tissue of the parent to float about, have silicious spicula in a part of their substance.—3. *Proteiform bodies*, which detach themselves from young *Spongillæ*, a few days after they have become fixed, and after having slowly moved for an indefinite period, fix and become developed. These bodies never contain silicious spicula at the moment of separation from the young parent.—4. *Tuberculiform bodies*, which may be seen to shoot out from different points of *Spongilla*, and die without producing either of the three above-named reproductive bodies. At the period they are given off, they never contain silicious spicula. These four reproductive organs of *Spongilla* are, however, reducible to three principal kinds, known by the names of *eggs* (oviform bodies), *gemmæ* (gemmiform bodies, which are ultimately free gemmæ, and tuberculiform bodies regarded as fixed gemmæ), and lastly *fragments* or the proteiform bodies which naturally separate from the parent.—p. 190.

M. C. Mylius on Uric Acid in the Excrement of Snails.—M. C. Mylius of Berlin has discovered, that the excrement of snails always contains uric acid. According to his experiments, this acid is secreted in a solid form by a glandular organ, situated directly beneath the shell, forming, without doubt, the urinary organ. This matter, which is of a white colour, is easily seen in the transparent skin. To collect it, cut the organ, and the matter escapes, which partakes of the consistence of paste or bouillie. When it is collected from a number of snails, agitate

it in water; this separates the albumen, while the uric acid is deposited, presenting, not a crystalline form, but a soft powder, like that of *Lycopodium*. The granules of this powder present, under the microscope, a spherical, transparent, and variable size, the largest measuring 0.00014", the smallest 0.00006", and the mean 0.00010" of an inch. A grain and three quarter of uric acid may be obtained from a common snail.

Mylius has met with this acid in *Helix nemoralis* and *H. hortensis*, but has never been able to meet with it in the genera *Lymneus* and *Planorbis*. The acid is neither combined with ammonia or any other alkali, but is secreted in a state of purity by the secreting organ.—*January*, 1841.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

May 27th, 1841.—*Professor Owen, F.R.S., &c. President, in the Chair.*

After the preliminary business of the meeting, the Secretary proceeded to read a paper from Dr. Haro of Metz, being "Observations on the production of Infusoria;" but as the author did not appear to be aware of what had previously been done by other philosophers connected with the history of the subject, we content ourselves with giving only the conclusions arrived at by the author, viz.—1. That the air is not in all cases the vehicle of the germs of true animalcules. 2. That substances in a state of putrefaction, only contain animalcules when in contact with other substances in which they already exist, and that they are not developed, except under certain circumstances. 3. That decomposition of organic matter only gives birth to rudimentary species, *Vibriones* and *Monades*, which, generally speaking, are not animals; and that if true animalcules can be observed in them, these can only be regarded as larvæ deposited in their substance by minute insects flying in the air, such as occur in the vibrios of paste and vinegar; that, consequently, there is not here any spontaneous generation, properly so called. Finally, that all other particles are rudimentary crystalline atoms, which are detached from organized bodies under decomposition, and are put in motion by electrical forces, until the aggregation of the molecules constitutes them solid bodies, under the form of the crystals which the substance affects to which they belong.

The most important fact detailed by Dr. Haro was, as Dr. Arthur Farre observed, the test for discovering the presence of albumen and fibrin, should it prove on repetition to be correct. Dr. H. states, that when *albumen* is subjected to decomposition in water *Monades* are produced; and, on the contrary, when *fibrin* is so treated, *Vibriones* are the animalcules met with in the fluid.

Professor Owen also made some remarks on the communication, in which he stated that the author could not have been acquainted with the previous researches of Professors Ehrenberg, Schultz, &c., and that

the question involved the animality of *Monades* and *Vibriones*, bearing more particularly on the question of spontaneous generation as restricted to Entozoa and Animalculæ.

The meeting then resolved into the conversazione and examination of objects.

Microscopical Memoranda.

Mandl on the Relations which exist between Blood, Pus, Mucus, and Epidermis.—The general conclusions arrived at by the author in his memoir read before the *Société Médicale d'Emulation*, June 3rd, 1840, are as follows:—1. The fibrinous globules of the blood, the globules of mucus, and those of pus, are identical. 2. All the globules are the product of the coagulation of the fibrin in the serum, which has transuded through the walls of the blood-vessels. 3. The liquid in which the globules swim constitutes the difference between pus and mucus. 4. If the fibrinous globules remain fixed to the surface of the membrane, where they are secreted, they become the nuclei of epidermoid cellules, which constitute the elements of the epidermis. 5. If, on the contrary, the fibrinous globules remain free on the surface of the membrane, they are expelled by the organism, and form an element of pus and mucus. 6. These two elements are simply filtered blood; that is to say, they contain all the elements of the blood, except the globules; the serum at the same time undergoing chemical alterations. — *Gaz. Med. de Paris*, July 1840, in *Brit. and For. Med. Rev.* Jan. 1841.

Locality for Craterium pyriforme.—This beautiful microscopic Fungus, which was first noticed by Mr. C. G. White on flint stones in an old gravel pit at Old Ford, near Bow, Middlesex, is now to be found most abundantly on the gravel pebbles on the banks of the South West-India Dock, and no doubt in other localities at this season. They are not restricted to pebbles only, nor found on every stone, but appear chiefly on the South Western aspect.—*Edward Stock, Poplar*, June 15, 1841.

Death of M. Turpin.—It is with much regret we record the death of this distinguished microscopic observer and draughtsman. His remains are deposited in Perè la Chaise, Paris. In a future number we intend inserting an abstract of his researches, and further details connected with the life of this illustrious observer.

XIX.—NOTICE OF THE ANIMALCULES OF THE RED SNOW.*

By Dr. C. Vogt.

THE researches of Mr. Shuttleworth, published in the *Bibl. Univ.* 1840, on the colouring matter of red snow, show, that the red-coloured snow of our Alps is not solely vegetable, but that it contains a great number of animals. But the observations of this botanist, although very exact, have not since been repeated a sufficient number of times, nor in a sufficient number of localities, to view them otherwise than the first steps towards facts, which throw a new light on the study of the microscopic Fauna. A number of details remained for further investigation, and as M. Agassiz made a prolonged visit at the glacier of the Aar, we took with us Ehrenberg's great work on Infusoria, and two microscopes, with a view to study the red snow in a fresh state, and to compare the same from different localities, wherever it was to be met with. The results we have obtained are by no means unimportant, as regards the new and curious forms that we have discovered, and the observations we have made on their mode of life, and the facts connected with the development and reproduction of these extraordinary beings, of which their presence in the midst of the eternal snow is in some manner a *dementi* given to the general ideas which are admitted on the conditions of the existence of organic beings. The circumstance which surprised us more than all, was the diversity of form exhibited by individuals collected from various localities. It is probable that each station possesses beings proper to it, associated with a certain number of other types more generally distributed.

The red snow was found this year (August 1840) in great abundance on the glaciers which descend in the valley of the Aar. We also observed it at the extremity of the glacier of Oberaar, on the glacier of Finsteraar, on the plains of snow which border the west flank of Siedelhorn, and in numerous points of the lower glacier of the Aar, between others near to that of Abshwung, in the neighbourhood of the hotel of Neuchatelois, near the crystal grottoes, on the lower glacier of Grindelwald, &c. The following are the organisms which we met with in these situations:—

1. The Infusoria called *Astasia nivalis* by Shuttleworth, see the 3rd

* From the *Bibl. Univ. de Geneve*, 21st May, 1841.

fig. in his plate. It is easily distinguished by its pyriform shape, and the rapidity of its movements. With the exception of the very small white vesicles, situated in the interior of the body, which look like stomachs, Shuttleworth has not given a description of the structure of the animalcule. Numerous observations have satisfied me, that it is enveloped in a carapace which encases the whole, and is only open at the anterior extremity. This opening is furnished with numerous small cilia, serving both as organs of locomotion and prehension. It is doubtless at this point that the mouth is situated, the position of which is indicated by an orange-coloured tint, which is clearer than the rest of the animal. The presence of the carapace together with the cilia, are characters which do not allow this animal to be placed with *Astasia*, as Shuttleworth has done; on the contrary, it ought to be placed in the family *Peridinia*, which Ehrenberg thus characterizes: *Animal distinctly, or to all appearance polygastric, without intestinal canal, having a carapace, with hairs or cilia scattered over the body, or on the carapace, often in the form of a girdle or crown, provided with a single aperture in the carapace, and furnished with vibratile organs.* It ought, otherwise, to be regarded as the type of a new genus, characterized by the absence of a groove in the carapace, and also that the stiff hairs are replaced by soft cilia, which is not found in any other genus of the family.

2. The *Gyges Sanguineus* of Shuttleworth, see his fig. 4. I will add, to complete the description given to this animal by the author, that I have frequently noticed, in those individuals in motion (Shuttleworth could only have seen dead individuals), the orange-coloured organs occupied the space between the carapace and the body, and which I believe to be the retractile lips (*lèvres*.) The animal moves slowly, although directed in every case. But that which distinguishes it above all, is its mode of reproduction; it gives off from several parts of its body small transparent buds, apparently vesicular, and for the most part filled with a *grenue* substance. As they enlarge, they are detached more or less from the body of the animal; sometimes two bodies of equal size, of which one is red and carapaced, and the other quite colourless, adhere by a very narrow point of attachment. By degrees this bud completely detaches itself from the parent body, and appears under the form of a colourless infusory animal, such as Shuttleworth has represented in his 7th and 8th fig., which approaches to *Pandorina hyalina* Ehr. I could not discover in these offsets anything beyond that which Mr. S. has already seen; they are perfectly motionless; their contents apparently *grenue*, become coloured by degrees from green to yellow, orange, and even a deep red, whilst the covering remains colourless, and is

converted into a carapace. It is at this point only that the motions of the animal become visible. I had the good fortune to observe, and to be able to make drawings of the various grades of this mode of reproduction, and I am convinced that this animal, far from belonging to the genus *Gyges*, on the contrary, ought not only to be looked upon as the type of a new genus, but still further, to constitute a family, on account of its very peculiar mode of reproduction and development.

3. I place in the genus *Gyges* of Ehrenberg another infusoria, of an equally remarkable form, which does not appear to have been observed by Mr. Shuttleworth. In the red snow may be occasionally seen globular organisms, containing in their interior from two to five individuals, enclosed in a carapace apparently of a vitreous character. The colour of these animals, thus living in the same case, is of a dark red; they frequently adhere one to the other, and arrange themselves in the form of a cross; they are also frequently separate. The small individuals, probably the young, were of a clear yellow hue; I could not observe the slightest motion in them.

4. An infusoria of the family of *Bacillaria*. It is very abundant in the red snow, and is the smallest of all the kinds I have met with. We frequently saw two of them adhering together, and ready to separate. Their colour is yellowish brown. With the exception of a few bright spots in their interior, I could not distinguish their structure, neither could I detect the slightest motion.

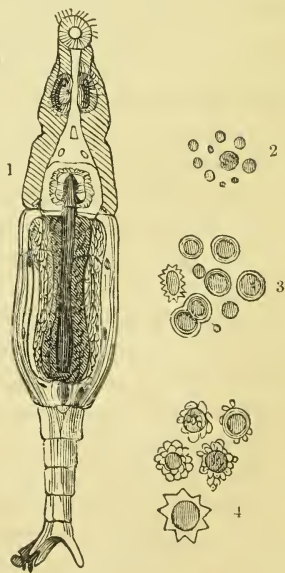
5. A species of *Aretiscon*, having two hooks to the feet. This animal, known under the name of *Macrobiotus*, has usually the intestine filled with several organisms met with in the red snow, and is that which gives it a red hue, whilst its natural colour is a light brown.

6. The most interesting animal of the red snow is a Rotifer, a variety of *Philodina roseola* Ehr. We met with it abundantly in the snow of the lower glacier of the Aar. Having remarked that the ovary was of a much deeper colour than the other parts of the body, I directed my attention especially to this organ, and I was not long before I perceived eggs in different periods of development. The young eggs were perfectly round, and of a deep red hue, absolutely similar to the globules of *Protococcus*, described and figured by Shuttleworth, in his fig. 2. I also found eggs with a thin transparent covering, furnished on all sides with small pointed projections. After a time others were also observed, of a larger size, but similar in form to those figured by Ehrenberg, and ready to be deposited. The great similarity of the immature eggs with the globules of *Protococcus* figured by Shuttleworth, attracted our attention, so much so, that at the moment the idea suggested itself, that these

globules were generated by the *Philodina*, and are to be found in the glandular appendages of the intestines. To assure myself of this, I fed some *Philodinas* with indigo, and by this I distinctly ascertained that the globules in question were situated exterior to the intestinal canal. But as very many of these same globules were found isolated in the snow, it became a matter of doubt whether those were the eggs of *Philodina*, or really those of *Protococcus*. I soon found the solution of this problem, by observing one of the *Philodinas* in the act of voiding the eggs; from that time it was evident that these animals do not always deposit eggs fully formed, but that they give out occasionally some not perfectly developed, and these are doubtless the globules, which, up to the present time, having been considered as those of *Protococcus*, are really animal organisms, the eggs of *Philodina*. When they are of a rosaceous tinge, I look upon them as winter-eggs, analogous to those of many of the *Rotiferæ*, which Ehrenberg has figured at their full development. I afterwards met with these several forms of eggs together with the *Philodina*, in the crevices of a polished rock below the glacier of Rosenlain, in the vicinity of Guttannen, and even on the borders of the lake of Neuchâtel, where the *Philodina roseola* with coloured eyes is very abundant.

After what has been stated, if there really exists *Protococcus* independently of these eggs (which does not appear to me likely, at least in the red snow of the Alps), it must prove that their identity is such, as to be mistaken the one for the other. Future researches may probably elucidate their distinguishing characters; for M. Joli, in his work on the salt-water ditches of the south of France, regards equally as *Infusoria*, those microscopic bodies which Turpin determined as belonging to the genus *Protococcus*.

In the accompanying figure, 1, the *Philodina rosea** of the red snow, with the different forms of its eggs, is seen magnified 360 diameters. The animal is



* The animal is here represented only *one half* the size as in the original plate,—the eggs are the full size.

seen from above, the body extended as in the ordinary act of progression on the bottom or side of the vessel in which it is kept. The three principal regions of the body are very distinct: 1. The head and neck, with the different organs of sense, and the commencement of the digestive system; 2. The trunk, which is nearly cylindrical, and is enveloped in a furrowed cutaneous carapace; 3. The articulated feet.

The anterior extremity, with its cilia, is expanded as in the act of touching; the rotatory organs are contracted: a little posterior to these may be seen in the median line, the respiratory tube, which is equally contracted, when spread out, it is much longer, and is furnished at its extremity with stiff cilia. Behind this tube the eyes are met with, which are obliquely placed; they are colourless in the variety from the Alps, whilst they are red or yellow in the common variety. Next comes the pharynx, with its two teeth, from whence the intestinal canal proceeds, which, in the figure given by Dr. Vogt, is of a blue colour, the animal having been fed on indigo. The intestinal appendages are distinguished from the ovary by their intense red colour. The foot, capable of expansion and contraction, is also seen. It is composed of seven rings; the fifth and sixth are armed with two points, the seventh is furnished with two claws, very much analogous to the posterior feet of the *Chenilles*. On either side of the body may be seen, in four different places, the organs which Ehrenberg described as vibratile branchiæ, but which in reality are nothing more than enlargements of two lateral vessels given off from the respiratory tube, and furnished with cilia. Similar vibratile enlargements are seen at the union of the neck with the body, in two situations in the middle of the body, and one at the side of the anus. The head and neck, as well as the feet, may be withdrawn into the coriaceous carapace of the body, which is susceptible of considerable dilatation and contraction. Fig. 2 represents those imperfectly developed eggs which have been mistaken for *Protococcus*. Fig. 4 shows the form of the winter-eggs not developed, with the covering in the form of a rosette; both the one and the other are met with in red snow. Fig. 3 represents an accumulation of the ordinary eggs of *Philodina*, collected from the crevices of the polished surface below the glacier of Rosenlain; the number is by no means limited.

The red snow of the upper glacier of the Aar and that of Siedelhorn, furnished us with *Philodinas* and eggs of different forms, similar to *Protococcus*. The lower glacier, and that of Finsteraar, presented us with all the organisms noticed in this communication.

XX.—EHRENBERG'S CONCLUSIONS ON THE ORGANIC COMPOSITION
OF CHALK AND CHALK MARL.*

1. MANY, and probably all, *White Chalk Rocks* are the produce of microscopic coral animalcules, which are mostly quite invisible to the naked eye, possessing calcareous shells of $\frac{1}{24}$ to $\frac{1}{288}$ line in magnitude, and of which much more than one million are well preserved in each cubic inch, that is, much more than ten millions in one pound of chalk. †

2. The *Chalk Marls* of the Mediterranean Basin are the produce of microscopic Infusoria, possessing silicious shells or cases, mostly quite invisible to the naked eye, intermingled with a small proportion of the calcareous animalcules of the chalk.

3. The peculiar state of aggregation in *White Chalk* does not arise from a precipitate of lime previously held in solution in the water of the sea, nor is it the result of the accumulation of the small animalcules, but it proceeds from a disintegration of the assembled microscopic organisms into much minuter organic calcareous particles; the reunion of which into regular, elliptical, granular laminæ, is caused by a peculiar crystalloid process, which may be compared to crystallization, but is of a coarser nature, and essentially different from it. The best writing chalk is that in which this process has been developed to the greatest extent.

4. The compact limestone rocks, which bound the Nile in the whole of Upper Egypt, and extend far into the Sahara or Desert, being neither white nor of a staining quality, as well as the West Asiatic compact limestone rocks in the north of Arabia, are, in the mass, composed of the coral animalcules of the European Chalk. This affords a new insight into the ancient history of the formation of Lybia from Syene

* Extracted from Mr. Weaver's View of Ehrenberg's Observations on this subject in the Annals of Natural History for June, 1841, p. 305.

† It is to be understood that I speak only of such Polythalamia as are well preserved, wholly disregarding their fragments. Of the well preserved there are contained in one-fourth part of a cubic line, or in one-twelfth of a grain of chalk, frequently 150 to 200 in number, equal to 600—800 in each cubic line, or 1800—2400 in each grain, and from 1,036,000 to 1,382,000 in each cubic inch; and hence in one pound of chalk the number far exceeds ten millions.

The larger Polythalamia and Bryozoa of the Chalk are best obtained from the sediment produced by brushing the chalk under water; the entirely microscopic forms remain long suspended in water.

to the Atlas, and of Arabia from Sinai to Lebanon, thus opening a large field to organic distribution.

5. Many of the chalk-like formations bordering on the Mediterranean in Sicily, Barbary, and Greece, really belong to the period of the European chalk-formation, as proved by their organic contents, although commonly held to be different from the chalk, and considered as tertiary. *

6. The chalk-beds of the south of Europe, around the basin of the Mediterranean, are distinguished from those of the north and east of Europe, by numerous well-preserved chalk animalcules, and less numerous inorganic laminæ; while in the north and east of Europe these relations are reversed. †

7. In the south of Europe the beds of marl which alternate with the chalk, consist of silicious shells of Infusoria, and flints are wanting; while in the north of Europe beds of flint alternate with the chalk, and marls with Infusoria are wanting. This exchange of character tends to explain the peculiar relation of flint to chalk, indicating that the pulverulent silicious particles of Infusoria have been converted into compact nodules of flint.

8. It has been lately remarked, that the chalk which contains flint is deficient in numerous silicious Infusoria, when compared with the Bilin slaty Tripel, or polishing slate (*Polirschiefer*), containing semi-opal; but this deficiency now disappears, and a rich substitute takes its place, the Infusoria in the north of Europe having been employed in the formation of flints; while in the south, remaining unchanged, they are preserved in the Infusoria marls.

9. The chalk animalcules most resemble those of the sea-sand and the Miliolites, which, up to the present day, have been ranged among the Molluscs with the Cephalopods; but neither of these are either Cephalopods or Molluscs, nor even Infusoria, as asserted by a late observer; but they are Bryozoa, animals of Moss-corals, which are most nearly related to *Flustra* and *Eschara*.

10. The sea downs of some, and probably of most coasts, are still in

* In Sicily, however, there occur many breccias of chalk, which have suffered a subsequent change, and may be referred to the tertiary epoch.

† Thus in the white and yellow soft writing chalk of the north of Europe, the inorganic crystalloid portions sometimes equal, or rather exceed in mass the organic remains; but in the south of Europe, in Sicily, these organisms, with their fragments, are greatly predominant, consisting, as it appears, exclusively of well preserved Polythalamia.

course of formation by living Bryozoa, which, though very small, resembling grains of sand, are yet, for the most part, larger than the chalk animalcules, and a large proportion of the sand of the Lybian Desert has been proved to consist of such grains. It is only in Nubia above Syene that the desert sand becomes a pure detritus of granite.*

11. In the various countries of the earth in which occur white and earthy, as well as coloured and compact rocks, composed of microscopic calcareous animalcules, the genera and species of these animalcules present so striking an agreement with those of the white chalk of Rügen, that they may well be deemed characteristic of one and the same period of geological formation. It cannot be asserted for a certainty, that the same forms have been observed anywhere else.

12. In the beds adjacent to, and more ancient than the chalk, namely, in those of the Oolite and Jura limestone formation, we have also clear evidence of the existence of other microscopic Polythalamia. These, however, are such as have not hitherto been found anywhere in the chalk.

13. The early assertion that *all* limestone was the produce of animals,† though resting on no sufficient foundation, and therefore justly held in slight regard by modern geologists, yet now deserves every attention, since it clearly appears that a limestone formation widely extended on the surface of the earth is composed of microscopic animals, visibly converted in a gradual manner into inorganic chalk and compact limestone. If similar phenomena appear also in the Jura limestone formation, and should become still further confirmed, these considerations (combined with the long-known existence of coarser corals and shells in both formations), tend to show how necessary it is, when examining the composition of any considerable portion of the solid mass of the earth, to strengthen our natural senses by artificial means, in order to obtain a distinct knowledge of the extent to which organic life may have contributed to its production.

14. The extreme minuteness of the chalk animalcules is strikingly proved by this, that even in the finest levigated whiting, multitudes of them are still present, and may be applied, without suffering change, to the most varied technical purposes; thus in the chalk coating given to painted chambers, paper, or even glazed visiting cards (when not coated with white lead alone), may be seen a pretty mosaic of well-

* On these very interesting and not easily-developed relations, I hope, at a future day, to be able to make a more special communication.

† By Linnæus in 1745 and 1748, and Buffon in 1749.

preserved Moss-coral animalcules, but which are invisible to the naked eye; and thus our natural vision receives from such a surface the impression of the purest white, little dreaming that it contains the bodies of millions of self-existing beings, of varied and beautiful forms, more or less closely crowded together, as in Plate IV. of Ehrenberg's work, where the subjects are magnified 300 times.

XXI.—MEMOIR OF THE LATE FRANCIS BAUER, ESQ., F.R.S., ETC.

AT the Anniversary Meeting of the Linnæan Society on the 24th of May 1841, the Bishop of Norwich, President, alluded, among others, to the death of this distinguished Microscopic Observer, an account of which we extract from the Proceedings of that Society:—

FRANCIS BAUER was born at Feldsberg, in Austria, October 4th, 1758. His father, who held an appointment as painter to Prince Lichtenstein, died while he was yet a boy, and the care of his education devolved upon his mother. So early was his talent for botanical drawing manifested, that the first published production of his pencil, a figure of *Anemone pratensis*, L., is appended to a dissertation by Störck, “de Usu Pulsatillæ nigricantis,” which bears date in 1771.

In 1788 he came to England, in company with the younger Jacquin, and after visiting his brother Ferdinand, who was then engaged in completing the beautiful series of drawings, since published in the “*Flora Græca*,” was about to proceed to Paris. But the liberal proposals made to him by Sir Joseph Banks on the eve of his intended departure, diverted him from this resolution, and induced him to remain in England, and to take up his residence in the neighbourhood of the Royal Garden at Kew, in which village he continued to dwell until the termination of his life.

It was the opinion of Sir Joseph Banks, that a botanic garden was incomplete without a draughtsman permanently attached to it, and he accordingly, with the sanction of his Majesty, fixed Mr. Bauer in that capacity at Kew, himself defraying the salary during his own life, and providing by his will for its continuance to the termination of that of Mr. Bauer. In fulfilment of this engagement with Sir Joseph, Mr. Bauer made numerous drawings and sketches of the plants of the garden, which are now preserved in the British Museum. A selection from his drawings was published in 1796, under the title of “*Delineations of Exotick Plants cultivated in the Royal Garden at Kew*,” and this was intended to be continued annually: but no more than three

parts, consisting wholly of Heaths, and containing thirty plates, were published.

In the early part of 1801, Mr. Bauer made for Mr. Brown, who had then been for some years engaged in a particular study of the Ferns, drawings of many genera of that family which Mr. Brown regarded as new. His drawings of *Woodsia*, made some years afterwards, were published in the 11th volume of our Transactions, in illustration of Mr. Brown's paper on that genus. At a later period he again directed his attention to that tribe of plants, his labours in which have within these few years been given to the world in Sir William Jackson Hooker's "Genera of Ferns." The 13th volume of the Linnæan Transactions is enriched with his elaborate drawings, accompanying Mr. Brown's memoir on *Rafflesia*; and the part published last year contains a paper by Mr. Bauer "On the Ergot of Rye," from materials collected between the years 1805 and 1809.

The plate which accompanies the last-mentioned paper is derived from drawings which form part of an extensive series in the British Museum, illustrative of the structure of the grain, the germination, growth and development of wheat, and the diseases of that and other *Cerealia*. This admirable series of drawings constitutes perhaps the most splendid and important monument of Mr. Bauer's extraordinary talents as an artist and skill in microscopic investigation. The subject was suggested to him by Sir Joseph Banks, who was engaged in an inquiry into the disease of Corn known under the name of "Blight," and the part of Mr. Bauer's drawings which relates to that disease was published in illustration of Sir Joseph's memoir on the subject, and has been several times reprinted with it. Mr. Bauer has himself given, in the volume of the "Philosophical Transactions" for 1823, an account of his observations on the *Vibrio Tritici* of Gleichen, with the figures relating to them; and another small portion of his illustrations of the Diseases of Corn, has since been published by him in the "Penny Magazine" for 1833. His figures of a somewhat analogous subject, the Apple-blight, and the insect producing it, accompany Sir Joseph Banks's Memoir on the Introduction of that Disease into England, in the 2nd volume of the "Transactions of the Horticultural Society."

Before the close of the last century, Mr. Bauer commenced a series of drawings of *Orchideæ*, and of the details of their remarkable structure, to which he continued to add, as opportunities offered, nearly to the termination of his life. A selection from these, which form one of the most beautiful and extensive series of his botanical drawings, was lithographed and published by Professor Lindley between the

years 1830 and 1838, under the title of "Illustrations of Orchidaceous Plants."

His other published botanical works are : 1. The first part, published in 1818, of "*Strelitzia Depicta*," a work intended to comprise figures of all the known species of that magnificent genus ; 2. "Microscopical Observations on the Red Snow" brought from the Arctic Regions by Captain Ross, the globules contained in which, by some regarded as an *Alga*, he described in the 7th volume of the "Quarterly Journal" of the Royal Institution, as a species of *Uredo* ; 3. "Some Experiments on the *Fungi* which constitute the colouring matter of the Red Snow," published in the "Philosophical Transactions" for 1820 ; and, 4. The Plates to the Botanical Appendix to Captain Parry's first Voyage of Discovery, published in 1821. One of the last productions of his pencil, illustrating the structure of a plant growing at Kew, which produces perfect seeds without any apparent action of pollen, will appear in the forthcoming part of the Linnæan Transactions.

In the year 1816, he commenced lending the assistance of his pencil to the late Sir Everard Home, in the various anatomical and physiological investigations in which that distinguished anatomist was engaged ; and in the course of ten or twelve years furnished, in illustration of his numerous papers in the "Philosophical Transactions," upwards of 120 plates, which were afterwards reprinted with Sir Everard's "Lectures on Comparative Anatomy." These plates, which form together the most extensive series of his published works, embraced a great variety of important subjects, chiefly in microscopic anatomy, and afford abundant evidence of his powers of observation and skill in depicting the most difficult objects.

It is this rare, and previously almost unexampled union of the observer and the artist, that has placed Mr. Bauer foremost in the first rank of scientific draughtsmen. His paintings, as the more finished of his productions may well be termed, are no less perfect as models of artistic skill and effect, than as representations of natural objects. Of all his predecessors, Ehret alone approaches him in these particulars ; among his contemporaries, none but his brother Ferdinand can be regarded as his equal.

Mr. Bauer became a Fellow of the Linnæan Society in 1804, and of the Royal Society in 1820. He died at his residence on Kew-Green on the 11th of December last, in the 83rd year of his age ; and was buried in the churchyard of that parish on the 16th of the same month.

Extracts and Abstracts from Foreign Journals.

[From Müller's Archives.]

On the Microscopic Constituents of Milk.—Professor Nasse, of Marburg, after a careful microscopic examination of milk from pregnant and suckling women, as well as from a cow and a bitch, and a comparison of his results with those of Donné and other preceding observers, says, that the following may be enumerated as the microscopic constituents of the normal secretion of the mammary gland:—1. The smooth, homogeneous, transparent oil-globules, to which, in addition to the common milk-globules, belong also the fine, scarcely-measurable particles and the larger drops of oil which swim on the top of the milk; 2. The cream-globules, which are distinguished from the oil-globules by their opacity, and their facette-like aspect; 3. The granulated yellow corpuscles; 4. The lamella of epithelium; 5. The more or less turbid medium, in which the four preceding kinds of corpuscles are suspended.

The first, the common milk-globules, are composed entirely of fatty matter, which dissolves completely and rapidly in ether. No membrane can be seen investing them. In the first nine days after delivery, the largest globules measure $\frac{1}{200}$ of a line in diameter; afterwards they are as much as $\frac{1}{100}$, but many are found of a much smaller size, and through all periods of lactation, the microscope, as well as other means of examination, show that the proportion of oil-globules in the milk varies greatly in different persons and under different circumstances.

In woman's milk perfectly fresh and warm, no other globules than these are sometimes found; but as soon as the milk has stood for some time exposed to the air, other corpuscles are discernible in it, which are distinguished from the preceding by a greater definiteness, a less degree of polish, and an appearance of facettes. In size they are nearly similar to the oil-globules, but if the milk be examined some time after it is drawn, a number are found much larger; $\frac{1}{50}$ of a line, or even more, in diameter. They are not so easily soluble in ether as the common milk-globules; they do not break up in drying, but they become clearer; acetic acid and ammonia have no influence upon them; they diminish for a time when the milk is boiled, but they re-appear gradually as it cools again; when left at rest they collect on the surface and form the cream; they easily stick together, and butter is formed when they are collected in one homogeneous mass. It is evident that they acquire their peculiar characters after they are drawn from the gland-ducts; for the author, as he watched them on the field of the microscope, could see individual globules which were originally clear, becoming on a sudden quite dark, and assuming the several characters of the cream-globules.

The yellow granulated corpuscles are almost peculiar to the colostrum; after the first few days from delivery, they cease to occur in the milk, and they disappear from it earlier in those who have borne chil-

dren than in primiparæ. They are not all spherical, the majority are flat. Their diameter is at most from $\frac{1}{200}$ to $\frac{1}{100}$ of a line; some are found measuring $\frac{1}{50}$ in length, and $\frac{1}{75}$ in breadth. They consist of small clear globules of fatty matter, which are connected together by a firm cement, which is unalterable by either ammonia or concentrated acetic acid, or by boiling. When the milk is left at rest, these globules collect on its surface; and when they exist in considerable numbers, render it unfit for making butter. The author believes that they are not, like the preceding globules, formed by the action of the air, but that they are produced by the secreting surface of the gland-ducts, and are analogous to the mucous-cells which are cast off from the surfaces of many mucous membranes, and to which they are in many respects similar.—*Heft III. p. 258, 1840, Transt. in Brit. & For. Med. Rev. 1841.*

[From Guerin's *Revue Zoologique*.]

Dujardin on Sponge.—If a small portion of a living sponge be placed between two pieces of glass under the microscope, the living substance is observed grouped in irregular roundish masses, enclosing green or variously-coloured granules, according to the species under examination. These irregular masses appear at first sight motionless; but by carefully adjusting the light (*éclairage*), on the margin of these roundish diaphanous bodies a change in form is apparent at every moment; these isolated portions not unfrequently, by the tearing of the mass into pieces of from $\frac{1}{100}$ to $\frac{1}{200}$ of a millimetre, move slowly in the liquid, and fix themselves on the glass by means of their mobile and diaphanous expansions, like the true *Amibes*. These isolated portions might be considered as simple green globules filled with granules, if care be not taken to view, by the aid of refraction, the borders of their expansions. Such are the facts observed by Dujardin in *Spongia panicea* and in *Clione celata* on the coast of Manche, and in the *Spongilla* from the Orne and environs of Paris, since the year 1835.—1838, p. 67.

M. Poiseuille is of opinion, that in those tegumentary parts of the body of man constantly and habitually uncovered, such as the face, neck, hands, &c., and which are consequently subjected to a medium temperature, the capillary vessels are of a much larger size than those situated in the other parts of the skin, which conclusion he arrives at from the circumstance of the capillary vessels circulating blood increasing in volume when the temperature is lowered to the medium in which they are placed.

M. Philippe Pacini of Pistoie, read a memoir at the Scientific Congress of Pisa, on a new organ discovered by him in the human subject. It consists of ovoid corpuscles, or small white opalescent globules, about two millimetres in size, which exist in considerable number in the subcutaneous cellular tissue of the palms of the hands and soles of the feet in man.

Humboldt's Natural Wadding or Flannel.—This substance has been found in great quantity on the surface of the earth, in Silesia, after an inundation of the Oder; it is composed of a filamentous tissue of *Conferva rivularis*, and fifteen different species of Infusoria, with silicious Carapaces.

Beaupérthuy and *Adet de Roseville* addressed some observations at the sitting of the Academy of Science, Paris (19th March 1838), tending to prove that putrid decomposition is preceded by the development of microscopic animalcules; these are first of the genus *Monas*, and ultimately become *Vibriones*, which multiply with considerable rapidity.

[From the *Annales des Sciences Naturelles*, Jan. 1840.]

M. P. Gervais on several Species of the Order *Acaridæ*.—In this paper two new species, (with figures), are added to the genus *Scirus*, viz. *S. obisium*, which is very small, not exceeding one-third of a millimetre in length, devoid of eyes, bright orange colour, and nearly transparent, &c. The other, *S. hexophthalmus*, having six eyes of a carmine colour; larger than the preceding; of an uniform orange colour. They were both found near Paris.

A species of the genus *Dermanyssus*, named from being met with on *Pipistrella*, *D. Pipistrellæ*, is also figured. Its length is about one millimetre, and is much smaller than the genus *Caris*. He has also figured, for comparison, *Psoroptes equi*, *Sarcoptes hominis*, and *S. dromedarii*; the latter was obtained from the scaly crust of a dromedary recently sent from Africa to the Jardin-du-Roi. No resemblance is to be perceived between that of the camel and the horse; whilst the first, on the contrary, so closely resembles that of man, that it may be mistaken for it if not examined with care; and it may be supposed, that it is to this similarity of structure that it passes from the animal to which it is peculiar, and lodges itself, with the greatest ease, conveying the disease from the one to the other. On careful examination, however, under high powers, *M. Gervais* considers that sufficient characters may be found to entitle it to the place of a species. In this paper the differential characters are given in detail; it is accompanied with a beautiful plate, on which seven species of the order are delineated.

Duvernoy on some points in the structure of *Limulus*, with a more particular description of their branchiæ.—This memoir, which is of some length, enters into the historical, descriptive, and theoretical parts of the subject.

Lallemand's paper on the origin and mode of development of Zoosperms, is inserted entire, for an abstract of which see p. 59 of this Journal. In some remarks which precede the paper, he states, that a single drop of fluid is sufficient for a perfect observation, a larger quantity being inconvenient. It is requisite to press the small piece of thin glass which covers it, to stop the currents of air there established, and to cause the bubbles of air to disappear which are there found imprisoned. Although the two glasses appear to touch, the Zoosperms move in the intervals with great freedom, as long as they have the power, and the evaporation has not proceeded to a too great extent; should this take place, a drop of water added, for some time prolongs their movements.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

June 24th, 1841.—*Professor Owen, F.R.S., &c. President, in the Chair.*

After the usual business had been completed, the Chairman stated, that the Council had given orders for three of the most perfect microscopes that can be constructed. They had therefore requested Messrs. Hugh Powell, Andrew Ross, and James Smith, each to furnish a standard instrument, made according to their own peculiar views. The meeting was also informed, that owing to professional duties, Dr. Arthur Farre had that evening resigned the office of Secretary, which he had so well filled since the establishment of the Society. A vote of thanks was proposed to Dr. A. Farre by Mr. George Jackson, for his assiduity and attention to the affairs of the Institution, which was seconded by Mr. Edwards, and carried unanimously.

The Secretary read an abstract of Dr. Haro's paper, read at the last meeting (see p. 79), which was again brought before the Society with a view to discussion.

Mr. E. J. Quekett made some remarks, and exhibited specimens of water obtained from the London Docks, which attracted his attention on account of its blood-red colour; which Mr. Q. finds, on examination, to be owing to the presence of a multitude of small Entomostracous animals, of the genus *Monoculus*; in the interior of the individuals of which a bright red spot was observed. They occur in vast numbers, at certain seasons only, such as in warm and very tranquil weather, and usually form about one-sixth of the bulk of the water. The common people call it *spawn*.

Mr. Cornelius Varley stated, that he had brought for exhibition specimens of *Nitella* in fructification (both the globule and the seed.) They were not quite ripe, but when they arrive at that state, he expects to meet with the same moving particles which he some years since pointed out in *Chara*.

The meeting then resolved into the usual conversazione and examination of objects.

Microscopical Memoranda.

Red and Green Snow.—In the 44th No. of Taylor's "Annals and Magazine of Natural History," is the translation of a paper from Wiegmann's Archiv. (Heft. I. 1840), entitled, "On Red and Green Snow, by the late Prof. Meyen;" from which we learn, that M. Ch. Martius, who twice accompanied the French expedition to Spitzbergen, is of opinion, that the colouring matter of red snow, *Protococcus nivalis*, and of green snow, *P. viridis*, "are one and the same plant, only in different stages of development."—Prof. Meyen, however, considers it to be still a question, whether the colours of the snow are really produced by different states of the same species; but he has no doubt but that the so-called Protococci belong, not to the vegetable, but to the animal

kingdom, being true Infusoria; that *P. viridis* is identical with Ehrenberg's *Euglenia viridis*, and *P. nivalis* with his *Euglenia sanguinea*, (the *Enchelides sanguinea* and *Pulvisculus* of authors); that these Enchelides "exhibit at times a perfectly motionless state, in which they appear spherical;" and that in this state they have been described as Proto-cocci; that, "it is these spherical, reposing animalcules, which often appear in incredible numbers, and, surrounded with a kind of slime, form more or less thick skins, which frequently cover the bottoms of shallow standing waters;" and it is in consequence of observing that these animalcules, after long remaining in this passive and inert state, occasionally resume their activity, that so many philosophers have spoken of a metamorphosis of Infusoria into plants, and *vice versâ*.—*Newman's Phytologist*, July, 1841.

Oberhauser's New Microscope.—Through the kindness of Dr. Andrew Ure, we were favoured with a sight of the newly constructed Microscope, invented by M. Oberhauser, optician of Paris, during his recent visit to London. We do not pretend to give any description of the peculiarities of its construction. It enables, however, the observer to see an object the size of a half-crown piece at one time, and possesses the advantage of not reversing it. The facilities which it affords to the dissector from the above improvement are equally important. On inquiry, we were informed, that the price is as near as possible £10, and facilities will shortly be afforded of purchasing them in this country. It is much to be desired that some optician, resident in the metropolis, would import the various simple improvements in Microscopes which are continually being made in Germany and France, as many of them are exceedingly good, and of a price more within the latitude of the humbler scientific inquirer. Whoever should undertake this, we promise him every support.—*Editor*.

Mode of obtaining the Wheel Animalcule, (Vorticella rotatoria.)—In all the old books, and in many modern works, directions are given to seek for this interesting animalcule in leaden gutters, when wanted for the microscope; but I never could find them in such situations, and have not been without them, in one half-pint mug, for the last seven years. My method of raising and preserving this species is the following:—Early in the spring I fill a three gallon jug with pure rain-water, (not butt-water, because it contains the larvæ of the gnat tribe.) This quantity more than suffices to fill a half-pint mug, and to keep it at the same level during the season. I then tie up a small portion of hay, about the size of the smallest joint of the little finger, trimming it so that it may not occupy too much room in the mug, and place it in the water; or about the same quantity of green sage leaves, also tied and trimmed. About every ten days I remove the decayed portion (with a piece of wire) and substitute a fresh supply. A much greater number of wheel animalcules are raised by the sage leaves; but I have sometimes been obliged to discontinue the use of it, on account of its producing mouldiness. I take them out with an ear-picker, scraping up the sides of the mug near the surface, (including the dirt which adheres to them, by the tail), or under the hay and sage.—*J. Ford. Chelsea College, June 25, 1841.*

XXII.—AN ABSTRACT OF THE “INFUSIONSTHIERCHEN” OF
EHRENBURG.—No. I.

*By W. Hughes Willshire, M.D., M.B.S., Physician to the
Fore Street Dispensary, &c.*

BEFORE presenting the readers of the Microscopic Journal with a short abstract of the great system of Ehrenberg on the Infusoria, a few prefatory remarks may not be out of place. The continued researches of naturalists into the infinitude of the organized creation, have been the means of bringing to light great numbers of living beings, of whose existence but a few years past, we had no reasonable proof. From the chilly regions of the Glaciers with their coloured snow, to the pools of Egypt with their living forms,—from the waters of the Cattegat to the sunny waves of Mexico,—from the Bergmehl of Finland to the brown mould of Newmarket, has the inquiring mind of the naturalist drawn evidence of the all-pervading principle of life. Forms from whence the essence of vitality has long since departed, have given up their remnants from the chalk of Oran : and beings invisible to the naked eye of man have been summoned forth from their entombment in their flinty sarcophagi. The *chaos* of old systematists has passed away, and a structure of beauty has been formed from its heterogeneous materials. But with this extension of our knowledge into the forms of the veritable creation, the same veil still hovers over us as it did in past times, and the limits of the great groups of animal and vegetable existence, are in reality as little definitely marked now as they were then. The *Psychodiary* kingdom of Saint Vincent is perhaps but an equivalent to the appendage of Linnæus to his Vermes, and the generic term *Anthophysa*, but tantamount to Plante-Animale ; and even should it be laid down as an axiom ruling the existence of organic life, as philosophically deducible from our advanced knowledge of its ruling principles, that there are no rigorous limits between the two great classes, but that the beings composing them are but the consequence of certain powers with which matter has been endowed by the Creator, and that forms resulting from such powers slide imperceptibly into each other—we are but a little more bold in avowing that which before was only tacitly allowed,

Should this not be maintained, what, it may be asked, are we to do ? If the organisation of the higher forms of the world, as lately opened out to us, is redolent of characteristics wherewith to stamp its indi-

viduality; is that of the lower as abundant in its efficiency too? If the cerebral ganglia of Rotatoria are proofs indubitable; are the *foramina* of the Bacillaria, and the *green matter* of Euastrum equally satisfactory? Is the absence of gastric sacs in the Sponge and their structure of cells, and the propagation by self-division in the Bacillaria, as also in the true Confervæ, no stumbling-block in the way? Though with Closterium is seen locomotion, is it not also with Oscillatoria? Though systems of support are found in the Silicious loriceæ; have not Caulerpa and Thaumasia skeletons as well? Has it not been shown by Schwann, that the law of development of which Schleiden had proved to obtain in the formation of all vegetable tissues, holds with equal truth in all the animal tissues, and that in their first periods of existence they follow the same laws of formation? Has it not been said by Turpin, that he could perceive no difference between the globules of milk from which Penicillum glaucum sprung, and the cells of animals and of plants? In fine, has it not been amply proved to us by the younger Agardh, that if the young Sponge is locomotive, the fixed Algæ are endowed with moving sporules too?

On the other hand, obscure as may be certain relationships between many of those organic creatures, whose existence is now known to us, how great and rich are the facts which are available to us as certain knowledge? Proofs of high conditions of organisation where they were never dreamed of, the beings possessing which swarm in localities never investigated before; organs of sense discoverable in moving atoms, to which the power of perception was not thought to belong; brain, muscle, and vessel, tracked out by the eye of the investigator in myriads of living beings until now not even seen.

In the short exposition of the System of Ehrenberg which we intend to follow these remarks, the amount of our knowledge of the minutest of organized beings will be seen. It is true, that many of the views of this great writer have been, and are still disputed by some; and the labours of Dujardin in France are to be cited in proof. Meyen and others in Germany have also lifted up their voices against the localization of many of the groups in the kingdom of animals, where Ehrenberg has placed them, after wresting them out of the kingdom of plants. The high development of the various sensual and other organs, has been by many doubted; and the mere systematic arrangement of the tribe, as also the propriety of its special groupings, have been canvassed. That the labours of many of the great German physiological critics have been profitably directed, cannot, I believe, be questioned; but the general value and high ability of the Infusionsthierchen, remains undisputed.

XXIII.—ON THE SILICIOUS BODIES OF THE CHALK, GREENSANDS,
AND OOLITES.*

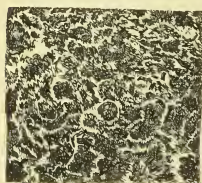
By J. S. Bowerbank, Esq., F.G.S.

THE singular forms presented by the tuberous masses of flint found in the upper chalk, have long induced naturalists and geologists to imagine, that their forms were derived from Alcyonic or spongy bodies; but I am not aware that this has hitherto been demonstrated to be the actual fact. Professor Ehrenberg's observations on silicious bodies first induced me, in common with many other persons, to cause thin slices of flints to be made, with the intention of procuring specimens of *Xanthidia*; and in the examination of these slices, I was struck with the frequent occurrence of small patches of a brown reticulated tissue, which presented nearly always the same appearance. The occurrence of this tissue, combined with the circumstance of finding spicula exhibiting nearly the same form and size, and always occurring in about the same proportion, along with numerous foraminated shells and other extraneous bodies, strongly induced me to believe, that the brown reticulated tissue was a portion of the remains of the organized body, the shape of which was represented by the flint nodules; and the indications thus observed, equally inclined me to believe, that if these flints were fossil organized bodies, they would almost inevitably prove to be sponges. With these views I commenced the investigation of the flints of the chalk, and as a preliminary measure I first examined, in a cursory manner, thin slices of flint nodules from various localities, especially those from the neighbourhoods of Gravesend and Brighton, and from Hertfordshire, Norfolk, and Wiltshire; and in all of them I found a perfect accordance in the structure and proportion of the reticulated tissue, and of the spicula before alluded to, and also in the occurrence of *Xanthidia* and *Foraminifera*. This similarity in the structure of the flints from all the above localities, renders it unnecessary to detail the results of each examination separately. I shall therefore confine myself to the description of what may be observed, by a careful investigation, in any chalk flint, without reference to the spot from which my specimens may have been procured.

When thin polished slices of the common tuberous flint of the chalk are prepared by the lapidary, mounted upon slips of glass, and sub-

* From the Trans. Geol. Soc. Lond., Vol. VI, p. 181. Read March 11th, 1840.

jected to examination, as transparent objects, with a microscopic power of about 120 linear, it will be observed, that the appearance presented to the eye is similar to that of a thin stratum of a turbid solution of decomposed vegetable or animal matter, containing fragments of extraneous bodies, mixed with small foraminated shells, spicula of sponges, and minute animalcules; especially of that highly interesting and beautiful genus, *Xanthidium*. Amid this heterogeneous mass, there are frequently to be noticed fragments of the brown reticulated tissue, to which I have before alluded; and occasionally, if the slice be from near the surface of the flint, these patches of brown spongy substance are comparatively of considerable size, and are dense and opaque. In this state, and by this mode of examination, the reticulated form of the structure can only be perceived at the edges of the mass. When it occurs in this well-preserved form, which is indicated to the unassisted eye by the appearance of rusty brown coloured spots on the flints, it is best examined by placing a small round black patch, about two lines in



diameter, behind the spot to be examined; and then illuminated by a leiberkuhn; and viewed with a power of 120 linear, it exhibits the characters represented in Fig. 1. In that specimen, which is from a flint procured at Northfleet, near Gravesend, the structure is remarkably well preserved. The mass of the sponge appears to consist of numerous cylindrical contorted canals,

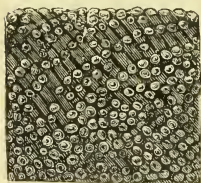
which, from the uniformity of their size and the minuteness of their diameters, would appear to have been the in-current canals of the sponge. Occasionally orifices of a considerably larger diameter are dispersed in the mass, and have every indication of having been the large ex-current canals. The walls of these canals present the appearance of having been formed of a thin glairy network, bearing a strong resemblance to the reticular substance of the common fresh-water sponge of the rivers of England. Amid the mass are found spicula, comparatively speaking, very sparingly dispersed; and minute foraminated shells of many species, imbedded in a precisely similar manner to what we observe on a larger scale in the recent Mediterranean sponge of commerce.* Very

* When the above passage was written, it was generally considered that the Keratose sponges were destitute of spicula; but I have since ascertained that they are occasionally found imbedded in the larger horny fibres of the sponges of commerce, and in numerous other sponges of the same genus from New South Wales; and I have described the mode in which they occur in a paper read before the Microscopical

frequently, when but little of the reticulated substance of the sponge remains, its former presence is indicated by the silicious matter exhibiting the aspect of a congeries of gelatinous globules, evidently arising from the silix having been moulded by the tissue amid which it was deposited; and the gelatinous molecules, when traced to the edges of small patches of the spongy texture, are found to agree in size and form with the orifices of the supposed in-current canals. In other cases, no indication of the former presence of the organized structure of the sponge remains; but its previous existence is proved by the mode in which the spicula, the foraminated shells and the other extraneous matters are found suspended, equally in all parts, and not precipitated to one particular portion of the flint, which would have been the case, had the space in which they were deposited been a mere hollow, arising from the imbedment and subsequent rapid decomposition of the body which has given rise to the peculiar form assumed by the mass; but, on the contrary, their continued suspension in their natural position indicates that the organized tissue in which they were entangled, retained its form and texture sufficiently long to allow of the infiltration and perfect fossilization of these interesting remains, in their original places. Had we no other evidence, the nature and position of these remains would have strongly indicated the former spongy nature of the tuberous-shaped flints of the cretaceous beds. If the chalk be carefully washed from the exterior of a flint with a soft brush, and a portion of that surface be examined as an opaque object by direct light, with a microscopic power of about 50 linear, we shall observe it to present a peculiar saccharine appearance, with occasionally deep circular excavations; and with small fragments of shells and other extraneous matters, partly imbedded in, or only slightly adhering to, its surface. If the surface of the flint be further cleansed from the chalk, by immersion in dilute muriatic acid, until effervescence ceases, the deep circular orifices will frequently be seen to have spicula projecting from their sides; thus strongly pointing them out as having been, in all probability, the mouths of the larger ex-current canals. If small pieces, about a quarter of an inch in diameter, be now selected, presenting the roughest

Society, Jan. 27, 1841. (See p. 8.) Since the publication of these facts, I have also ascertained, from the examination of an Australian species of Keratose sponge, which was brought by Mr. Gould from Swan River, preserved in spirit immediately after being taken from its place of growth, that silicious spicula occur in great numbers in the fleshy substance that fills up the horny network of the sponge in its live state. It therefore ceases to be an anomaly, as it might have hitherto been supposed, that silicious spicula should be found imbedded in the fossilized remains of a Keratose sponge.—*March* 1841.

and most saccharine aspect, and these be illuminated by a leiberkuhn, and examined with a microscopic power of 120 linear, under favourable circumstances, it will be seen that the surface is formed by a complex mass of small contorted tubuli, the apices of many of them being furnished with a minute perforation, as represented in Fig. 2.*



The tubuli on the surface of the flint stand boldly in relief from the more solid portion of the white crust, which surrounds the dense and semi-transparent mass. If we give but a slight consideration to the circumstances under which these bodies have been probably buried, we shall at once perceive that the characters exhibited by

the surface of the flints, and the state of the tissues at this part, are exactly such as we should naturally expect to be the case; for if a modern sponge of a close texture be immersed in water, in a tranquil situation, and a gradual deposit of calcareous silt, of low specific gravity, were to take place upon it, the deposited matter would penetrate the substance of the sponge to a very slight extent only, while the interior of the space would remain filled with pure, or nearly pure water, and the portions of its structure thus embraced by the calcareous deposit, would be protected to a great extent from the operation of other agents; and we might reasonably expect that, although the minute hollow tubuli might be assailed from the interior of the mass by a second and more fluid matter, and thence become silicified, yet that the space between them would be occupied by the matrix in which they were imbedded; and this is exactly what appears to have taken place during the process of the fossilization of the sponge of the common flint. The structure, both internal and external, and the peculiarities thus described, are common to the great mass of the tuberous flint nodules of all the localities of the chalk formation of England, from which I have been able to procure specimens, and under circumstances where we should have scarcely expected them to have been preserved.

The structure and other characters of the layers of tabular flint are in perfect accordance with those of the nodular flints. *Xanthidia*, spicula, and foraminated shells, are dispersed with equal abundance in its substance. The upper surface resembles, in every respect, that of the flint nodules, while the under one presents, even to the unassisted

* A similar tubular structure of the fibre exists in the recent *Spongia fistularis*, described and figured by Dr. Grant, in Vol. II. of the New Edinburgh Philosophical Journal.—March 1841.

eye, a still more strongly marked spongy aspect. Its general appearance is that of a sponge which has been built upon an irregular surface, and has followed the whole of the sinuosities. The great ex-current canals are larger and more numerous than usual; and the spicula are more abundant, frequently projecting from the surface, while the *Foraminifera* are attached so abundantly to it, that upon a superficies of an inch and a half square, I have counted upwards of twenty specimens of various species, some of which were attached only by a minute portion to the mass, precisely in the manner in which small bodies are frequently attached to recent sponges. It would thus appear, that the only difference between the tabular and other forms of flint was, that at the period of the formation of the tabular flint, the original sponge was built upon a firmer and less changeable surface than usual: and that under these circumstances it had obeyed its natural instinct, that of coating over any mass upon which its gemmule might have chanced to settle, in a manner precisely analogous to the habits of the fresh-water sponge of our rivers, and to many other parasitical species, which are inhabitants of the sea at the present period. Wherever the sponge had settled upon a shell, or *Echinus*, this habit of coating the body it was based upon, is strongly illustrated; but as the substance thus built upon was probably to a small extent immersed in the silt or mud, we rarely find more than half or two-thirds of the surface enveloped; and from this circumstance it is, that we detect in chalk fossils so many which are more or less imbedded in flint; and among these, instances are found, varying from cases in which the sponge-gemmule had not long settled and commenced developing itself, to where it had grown to such an extent as to have exceeded many times the size of the base, upon which it most probably at first settled. The great mass of nodular chalk flints does not exhibit any indication of a base, except in those instances where extraneous substances appear upon the surface; but this may be readily accounted for, when we consider that, probably, in the first instance, the gemmule was attached to some minute fragment of a shell or other substance, and that its further development took place while it was merely recumbent on the silt or mud; in the same manner as we occasionally find specimens of modern corals, &c., without any apparent base, the original attachment having been built over, after it had become separated or liberated. In one specimen of flint in my possession, the sponge appears to have been torn or injured, nearly at its middle, as a broad and distinct band or collar has been built round it, evidently with a view of repairing the injury, and strengthening the substance at the weakened part.

(To be continued.)

XXIV.—ON THE ANIMAL OF FORAMINIFERA.

By M. Desjardins.

DESJARDINS is convinced that the shell is not internal, but on the contrary external, and that the animal, absolutely deprived of the organs of locomotion, and even of respiration, is composed of a set of limbs or lobes which grow and successively envelope it. The fleshy portions cannot be seen from without, except when a new limb is produced and is not yet incrustated. On breaking the shell, it may be observed that the mass of the animal is as simple as that of *Planaria* or even of *Hydra*; and by dissolving the shell by the aid of very dilute nitric acid, the entire body formed of a series of limbs which occupy the chambers, may be obtained, susceptible of being unrolled, and presenting an aspect different according to the genera. Thus in *Miliola*, the limbs have the form of sheathing leaves, longitudinally plaited; in *Vorticialis*, they assume the form of the letter V, in which the two arms are applied in approaching the preceding portions, and which are bordered by lobes or crenulations; in *Cristellaria*, the limbs cross, and are bound together by fleshy tubes, in number varying from one to four, and increase successively by five limbs. On the other hand, the genera *Rotalia*, *Melonia*, and *Troncatulina*, &c., leave after the action of the acid, a transparent membrane which envelopes the limbs, not allowing them to be separated; and the latter two have this membrane furnished with projecting tubes, in the interval of which the crust (*encroutiens*) of the shell is deposited, thus proving in these cases that the animal matter is united in globular masses in the interior, as in the green matter of *Zygnema*.

From these facts it results, that these bodies can neither be related to the Mollusca, nor to any other class actually established in the animal kingdom; and consequently M. Desjardins is led to propose the name of SYMPLECTOMERES, for their class, thus indicating that they are formed of *portions folded together*.—*Bulletin. de la Soc. des Sciences. Nat. du France, No. III.*

Extracts and Abstracts from Foreign Journals.

[From *Guerin's Revue Zoologique*, 1840.]

Laurent's considerations relating to Animal Oology.—On the subject of the above communication relative to the four kinds of reproductive bodies of *Spongilla fluviatilis*, M. Laurent, at the sitting of the Philo-

matic Society of Paris, June 16, 1840, added his views relating to Animal Ovolgy.

He affirms that, when studying these bodies under both the simple and compound microscopes of different powers, with all the necessary precautions, and by means of a new compressor (*compresseur*), presented to the Academy of Sciences previously, he has been able to prove that, the general theory of Wagner does not apply to the several kinds of reproductive bodies of *Spongilla*. On this subject he detailed the results of his observations on the eggs and gemmæ of *Hydra vulgaris grisea*, which equally invalidated the Ovolgical theory of Wagler, and he concluded that, to proceed with more latitude in the investigation of the Ovolgy of animals, it would be better to adhere to the general formula of Harvey, which may be traced back to the time of Aristotle, for the reason that this formula expresses more clearly the whole of the facts known, without neglecting even one. It runs thus:—*Omne vivum ex ovo. Diversa primordia diversarum viventium ;.....conveniunt in uno ; primordium vegetale.* This *primordium vegetale*, is, says he, a kind of *cambium animale* already designated by German Zootomists by the name of *Blastema*; by M. Dujardin, under that of *Sarcode*. M. Laurent having observed and described it in the embryos of Mollusca, and other lower organisms, proposed to characterise it by the name of *Tissu blasteme*, in order to distinguish it from cellular tissue, and all the other living tissues in the organism of animals.—P. 190.

Valenciennes on the Electrical Organ of Silurus electricus.—At the Academy of Sciences of Paris, August 17, 1840, the author read a memoir, being New Observations on the Electrical Organ of *Silurus electricus* (*Malapterurus electricus*). The author related that M. Geoffroy St. Hilaire, had described this organ as a mass of thick and compact cellular tissue, separated by a strong tunic. Rudolphi has observed a second tunic. M. Valenciennes stated, that he had seen not only one, but *two* similar tunics between them.—P. 253.

On the contractility of the Blood-Vessels.—Dr. Heule, of Berlin, endeavours to prove that all congestion of blood in the capillary vessels, and inflammations, are due to a species of paralysis of the coats of the capillary vessels. To prove this fact, he first endeavours to demonstrate that these vessels are possessed of a certain degree of contractility in their normal state, and that they are under the influence of the nervous system, as well as all other parts which contain muscular fibres. He then shows that they possess the same structure as the blood-vessels of greater calibre, and that these last, as well as the solid or hollow muscles, whether of organic or animal life, are composed of the same elements. This analogy of function and of structure, he appears to have proved from the microscopical examination of the muscles, the muscular tissue of the heart, the middle coat of the arteries, the walls of the capillary vessels, the subcutaneous cellular tissue, and the dartos. The functional differences of these structures, he says, consist in this—that the movements of the solid muscles are subject to the will, and may be determined by mechanical and galvanic irritants, but not by the

action of cold; whilst the hollow muscles of organic life are excitable by the same agents as the muscles of animal life, but are incapable of being acted on by the will.

The middle coat of arteries, which has the same structure as the muscles of organic life, cannot be excited by the will; but may by mechanical irritants and by cold, but not by galvanism. If then, says he, the circulation is carried on in the larger vessels with the aid of contractility, which is a function under the influence of the nervous system, the capillaries must act in the same way, as their structure is identical. When the contractility of the capillaries is diminished by paralysis or want of nervous energy, the circulation is badly maintained, and congestions and inflammations are the result.

Dr. Heule states his ideas of the proper division of inflammations and congestions of blood; but they are not to be supported by facts.—*Wosenschrift für die Gesammte Heilkunde*, Oct. 1840. Translated in *Edin. Med. and Surg. Journal*, April 1841.

[From the *Annales des Sciences Naturelles*, for March 1841.]

Researches on the changes in the proportions of some of the principles of the Blood (fibrin, globules, solid contents of serum, water), in various diseases.—By Andral and Gavarret. The details of this interesting communication are of greater interest to the physiologist than to the microscopist. The paper was commenced in the xiv. vol. (1840) p. 361.

Observations on the growth and changes of the Genera Campanularia and Syncoryna.—By M. S. L. Lowen. The conclusions arrived at by M. Lowen, first with respect to the larva of the genus *Campanularia*, (and indeed the whole family of the Sertularidæ, are, that the *Campanularia* are free, and not attached during the early period of life, swimming here and there. They are, in this larva state, altogether different in form to that which characterizes them in their perfect state. In the latter, the *Campanularia* is fixed, and enclosed in a covering (or bark) of a horny nature. This once produced, is but an inanimate excretion, from every part of which the living portion which made it becomes detached, and does not further nourish it. It is within this protecting envelope that the Polyp is developed; that it takes the number, form, and dimensions of all its parts; it then breaks mechanically through its capsule, and is arrested in its growth.

If the whole of these phenomena are collectively considered, the term metamorphoses cannot be said to be inaptly applied; the comparison of the first state to that of a larva, and the second to that of the chrysalis; to see the male Polyp developed within its cellule, the image surrounded by its chrysalis-like covering, which even protects it after it has opened. The female polyp, on the contrary, disengages itself complete from its larva, accomplishes the end which is designed, that of assisting propagation, and dies. The species on which the observations were made, was *Campanularia geniculata*.

With regard to the genus *Syncoryna* of Ehrenberg, two species are found on the coast of Norway, *S. ramosa*, Ehr., and *S. Sarsii*, Lowen,

with which the author made his observations, and arrived at the following conclusions:—As soon as the female Polyp has acquired a certain degree of development, instead of having five tentacles, it raises in its interior, projections, which are small capsules, fixed by a pedicel and filled with a mucous substance. These become transformed into eggs or gemmæ. As soon as they are mature, the capsules are detached and move freely; at length the eggs are expelled from them, and become fixed on the earth, or on some other submerged body.

If we compare the genus *Syncoryna* with that of *Campanularia*, we shall find the following affinities and differences:—Both have an external capsule in the form of a sac, with transparent walls, the border of which bears the cirrhi or tentacles, and in the interior of which, vessels convey the nourishing fluid towards the stomach. This last organ is formed by a kind of budding or enlargement of the intestinal canal. The eggs appear around the alimentary cavity; but the difference in form of this external capsule, the different number of tentacles, the presence of eggs, at least in the *Syncoryna Sarsii*; the vivacity of the movements of this last genus; the almost perfect immobility of *Campanularia*; the probable circumstance, that *Syncoryna* becomes free at a period of its existence; the atrophy, on the contrary, of the female Polyp of *Campanularia*, testify the great points of difference which exist between these two genera.

The following are the characters given by M. Lowen, to his new species of *Syncoryna*:—

Sync. Sarsii.—Semipollicaris, capillacea, tubulis $\frac{1}{10}'''$ — $\frac{1}{12}'''$, crassis, lævibus; gemmis elongatis, arrectis; parce ramosa. Masc. tentac. 10—16; Fem. globosis, cirris elongatis; oculis exquisitè rubris; campanula membrana perforata, clausa.

Hab. In fissuris rupium, etiam in aquâ stagnante, ad insulam Mass-koïr, &c., Bahamas.

The above paper is illustrated by a beautiful plate, in which the anatomical details are clearly defined, and the new species figured.

[From Poggendorf's *Annalen*, 1840.]

Ehrenberg on the Mineral called Dysodil, as a product from the Shells of Infusoria.—In 1808, M. Cordier, in Paris, gave this substance the name of *Dysodil*, as a peculiar species of mineral; it had, however, previously been placed by mineralogists amongst the bituminous substances, and called *foliated mineral pitch* (blättriges, *Erdpech*). As is well known, it is combustible, and in Sicily, where it was first discovered, it is used as peat.

As early as the 16th of April 1840, I made a communication to the Society of the Friends of Natural History in Berlin, (see the *Staatszeitung* of the 29th of April), in which I stated, that this mineral occurring in Sicily, resembling yellow wax, and composed of densely matted together silicious shells (*Kieselschalen*) of the *Navicula*, penetrated and cemented by a kind of resin, consists of a species of mail-

covered Infusoria. I also stated, that there existed in the collections of the mineral dealer, M. Krantz of Berlin, a lignite from Westerwalde, the colour of which is quite black, and in which may be recognized all the microscopic characters of the yellow Dysodil of Sicily, but which is distinguished by its containing a considerable quantity of pine-tree pollen, and other vegetable remains. Since that time it has been found in two other places. The foliated serviceable bituminous coal from Geistinger Busch, near Rott and Siegburg, to the north of the Siebengebirge, is, although as black as old leather, quite similar to the Dysodil, only it is richer in vegetable remains.

In a fourth similar foliated lignite from Vogelsberge, given me to examine, as were the former, by Ober-Bergrath von Dechen, there may be recognized very beautifully preserved Infusorial shells. This substance is also like the black dry sole of a shoe. From these inquiries we see, that the species of mineral called Dysodil, belongs to the Infusorial conglomerates, and it is evidently a *Polirschiefer* or *Blättertripel*, accidentally *penetrated by mineral pitch*; whilst at Bilin, Cassel, &c., it appears without any admixture of bitumen. Its colour may be yellow, or even brown and black. It nowhere forms exceedingly large, but rather extensive and useful beds. — *Ann. Nat. Hist. Vol. V, p. 150.*

Turpin on Crystals of Carbonate of Lime in the eggs of Cryptella Canariensis.—Numerous crystals of carbonate of lime form the inner portion of the external covering of the egg of *Cryptella*. To observe them well, it is necessary to cut slightly the external covering, so as to obtain the internal envelope entire, with its albumen and vitellus. Portions of the external covering, viewed under the microscope with a power of 200 times, show that it is transparent, yellowish, and furnished with a net-work of very fine fibres, somewhat regular, and between the coats of which exist a great number of very small globules, varying much in figure and size.

The internal surface of this covering is, as it were, studded with a layer composed of an infinite number of crystals of carbonate of lime. These crystals vary in size, are semi-transparent, greyish, and appear like fine sand spread uniformly over it. They also vary in their forms and angles, and instead of presenting a transparent appearance, the angles and facets were those of the fine rhomboids, which I have discovered in the eggs of *Helix aspersa*,* *H. hortensis*, *H. ericetorum*, *H. pomatia*. Their forms, and particularly their indistinct angles, are very much analogous to those met with in the interstitial tissues of all parts of the body of *Paludina vivipara*. These crystals, measured by a micrometer, varied from $\frac{1}{200}$ to $\frac{1}{75}$ of a millimetre.

It is very remarkable, that the particles of carbonate of lime, which gives the substance to the shells of the eggs of birds and reptiles, but in them are deposited in confusion, molecule by molecule, crystallize in the *rhomboidal* form in the egg of *Cryptella* and *Helices*, at least in the

* Annales des Sciences Naturelles, Vol. XXV, pl. 15.

four species above quoted. — *Webb et Berthollet's Synop. Mollusc. des Iles Canaries.*

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

July 21st, 1841.—*J. S. Bowerbank, Esq., F.G.S., &c., in the Chair.*

Mr. W. Banks Hudson was elected a member. — A paper was read from the Rev. J. B. Reade, M.A., F.R.S., “On the process of Charring vegetable tissue, as applied to the examination of the Stomata in the Epidermis of Garden Rhubarb.” — The object of the author was to give the details of the results of a recent application of this process to epidermis of the leaf-sheath (*Ochrea*) of the common garden rhubarb, which was obtained by macerating it in water for a few days, and removing it carefully by means of the fingers. He alluded to the opinions of Brown, Lindley, Decandolle, Brogniart, Link, and others, connected with the matter in question; and Mr. R. considers, that those who deny the existence of apertures *in toto* in the stomata are unquestionably wrong. After describing many points in detail, the following facts were considered as established: — That, in the simple uncharred state of the semi-transparent tissue, there is much room for difference of opinion, so that the eye, fortified by a little previous theory, might most probably see the *stomata* either open or closed; that the application of the process of charring proves, beyond a doubt, that the *stomata* in this tissue of the rhubarb are *distinct openings* into the hollow chambers of the parenchyma of the leaf; that the perforation is the rule, and not the exception, in the structure; and that the exception, where it exists, *i. e.*, where the *stomata* are closed, proves the existence of the overlying membrane discovered and described by Mr. Robert Brown. This last fact, Mr. Reade considers to be very satisfactorily established. The membrane alluded to, although in some cases wholly absent, yet in others it slightly projects, beyond and along the margin of the aperture; it is sometimes partially extended quite across, and again, as a delicate *tympanum*, it wholly overlies the *stomata*.

Mr. E. J. Quekett exhibited some fossil Infusoria received from Prof. Bailey, West Point, New York, lately discovered by Prof. W. B. Rogers of the University of Virginia, underlying the city of Richmond. The stratum of that point being about twenty feet in thickness, and no doubt extending some considerable distance, as the same formation is observed on the banks of the Rappahanoeh river. The fossil Infusoria hitherto received from the United States, have been all of recent formation, from fresh-water deposits; but the specimens exhibited are all marine, belonging to a much earlier formation; and, according to Prof. Bailey, occupying a position in the tertiary strata between the *Eocene* and *Miocene* periods.

The silicious skeletons of Infusoria observed are several: The most common being a *Gallionella*, not at all like any figured by Ehrenberg, probably a new species; *Actinocyclus* of six rays (*Senarius*, Ehr.), others of ten rays, and some of four only. Amongst other remains are some

discs of beautiful structure, appearing as if ornamented as the engine-turned case of a watch; and some other bodies, having the appearance of a cellular nucleus, from which radiate four spines of unequal lengths. Besides these were several other forms, never before observed in the fossil Infusoria of other countries.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

July 1st, 1841.—*Mr. Yeates in the Chair.*

The Secretary having read the Minutes of the last meeting,

Mr. Bergin read a letter from Captain Portlock, enclosing a portion of Infusorial earth from the county of Down, at the base of the Mourne mountains. It was taken from the bank of a river under the bog.

A small portion of this earth having been examined under the microscope, was found to contain principally *Naviculae*, *Bacillariae*, *Eunotiae*, with fragments of *Achnanthes*, and *Confervae*. Mr. Ball proposed to separate the species, or rather sizes, contained in Infusorial earths, by washing in glasses, in the manner employed for preparing emery of different degrees of fineness.

Mr. Yeates presented to the Society a modification of the compressor, answering as a fine adjustment and universal object holder. He was requested to furnish the Secretary with a detailed description of the instrument, which he promised to do.

Microscopical Memoranda.

Ehrenberg's further remarks on the Animals of the Chalk.—M. Ehrenberg has communicated the result of his continued researches on the living animals of the Chalk, to the Academy of Berlin. He stated, that he had received from Berzelius some fresh mud from the sea-coasts of Sweden, which the Archbishop of Gottenburg had collected in the Island of Tjoern, in the Cattegat. The most important, in a scientific point of view, were twelve living species, which had only hitherto been met with in a fossil silicious state, in the chalk marls of Caltanisetta in Sicily, and at Oran in Africa. Amongst them occurs, in a living state, the *Grammatophora* (hitherto *Navicula*) *Africana*, which has only been met with in a fossil state in the marls of Oran; the recent *Oceanica* also has only been met with in the marls of Greece. There is also to be met with in the waters of the Cattegat, a prismatic infusorial form, which Ehrenberg has observed in the marls of the Oran, which would belong to the genus *Staurastrum*, if it could be placed in the subdivision of Infusoria, characterised by a soft vertex (*carapace*), and which is distinguished by having four apertures at the four angles. He proposes to class it under a new genus, by the title of *Amphitetras antediluviana*. Among the living forms of the Northern Seas, he has also found one similar to the *Dictyocha Speculum*, but spiny, like the *D. aculeata* of Sicily. Lastly, he has discovered a series of eight species of the genus *Actinocyclus*, of the radiated subdivision, destitute of a septum, which form the great mass of silica in the chalk marls of Cal-

tanisetta, and especially of the Oran marls, and which are characterized by the number of their rays. The species possessing 6, 7, 8, &c. rays, are particularly observable, and which are known by the terms *A. binternarius*, *A. septenarius*, &c. In addition to these discoveries, Ehrenberg, since this communication, has found in the water of Cuxhaven, in the living state, three silicious Polythalamia of the white chalk, and two silicious Infusoria of the chalk marl. These are *Rotalia globulosa*, *R. perforata*, *Textilaria globosa*, *Gallionella sulcata*, and *Navicula didymus*. To these seventeen forms, occurring in a living state, and also fossilized in the chalk formations, Ehrenberg adds two silicious Infusoria, which have since been detected in the chalk marl, viz., *Striatella arcuata* and *Tessilla catena*. These nineteen forms now noticed, combined with these announced in October 1839, and June 1840, make twenty-one genera and forty species of Polythalamia and Infusoria, which are now found alive, and also occur in a fossil state in the chalk formations.—*Athenæum*, July 24, 1841.

Ehrenberg's New Method of observing the Animalcular Composition of Chalk.—Place a drop of water upon a lamina of mica, and put into it of scraped chalk as much as will cover the fine point of a knife, spreading it out, and leaving it to rest a few seconds; then withdraw the finest particles, which are suspended in the water, together with most of the water, and let the remainder become perfectly dry. Cover this remainder, so spread out, with *Canadian balsam*, the turpentine of the *Pinus (Abies) balsamea*, and hold it over a lamp until it becomes slightly fluid, without froth. A preparation thus made seldom fails, and when magnified 300 times in diameter, we see that the mass of the chalk is chiefly composed of minute well-preserved organisms. In this preparation all the cells of the Polythalamia appear at first black, with a white central spot, which is caused by the air contained in the cells, which, as is well known, appear under water as annular black bodies; but by degrees the balsam penetrates into all the single cells, the black rings of the air vesicles disappear, and we recognize all the small cells of the Polythalamian animals, often presenting a very pretty appearance.—*Note to Mr. Weaver's View of Ehrenberg's Observations on the Organic Composition of Chalk*, in *Ann. Nat. Hist.*, June, 1841, p. 309.

Ross's Educational Microscope.—Mr. Ross has at length completed, for educational purposes, a compound microscope of strength, durability, and steadiness, and of a very simple construction, which contains all that is requisite to use with perfect success magnifying powers to 350 times linear. It is made the basis of the most complete compound microscopic, so that the various mechanical conveniences and appendages which constitute the most perfect instrument, may be applied at the convenience of the purchaser. The optical part consists of three combinations, which, in conjunction with two eye-pieces, give magnifying powers of 30, 60, 80, 120, and 250 times, and with an additional eye-piece 350 times, with definition capable of resolving the usual test-objects, such as the markings on the scales of Menelaus, clothes moth, and Brassica, and exhibiting the stronger order of markings on the scales of the Podura. We inspected this instrument at the last meeting

of the Microscopical Society of London, and can safely recommend it to the attention of the scientific public. The price of this instrument is only £12.—*Editor*.

Gulliver on the Muscular Fibres of the Œsophagus and Heart in some of the Mammalia.—The author, after alluding to the difference of opinion that exists as to the extent to which the muscular fibre of animal life invests the gullet, a discrepancy which has probably arisen from the want of a sufficient number of comparative observations on the lower animals, and states, that it has been generally concluded, that this fibre is confined to the upper portion of the tube, Prof. Müller, Dr. Schwann, and Mr. Skey informing us, that the striated muscular fasciculi are either confined to this part of it, or belong only to the muscles of the pharynx; while M. M. Ficinus and Valentin have been led to assign a much more extensive range to the fibre in question. He then proceeded to give the details of his investigation in this subject, from which he concludes, that the muscular fibre of animal life extended much further towards the stomach in certain brutes than in man, but that there was also a remarkable difference in this respect even among genera of animals.—*Proc. Zool. Soc. Sept. 10, 1839*.

Ehrenberg on Neurine.—Professor Ehrenberg has shown, that neurine actually consists of very minute fibres; and he informs us that these fibres can only be discovered by the aid of a magnifying power of 300 diameters, and that he was sometimes obliged to have recourse to a much greater magnifying power, as 800 diameters, in order to bring them into view. He examined thin slices of the recent brain, and states, that the fibrous structure was in general most obvious at the margins of the slices. These fibres, in the cineritious portion, are interspersed with globules and plates; the greater number of these fibres, instead of having a regular cylindrical form, are knotted like a string of beads, the swelled portions being situated at some distance from one another, and united by narrower parts, which are continuous with them, and are formed apparently of the same material. Besides these fibres, which Ehrenberg calls *articulated*, he observed, towards the base of the brain and crura cerebri, other somewhat larger fibres, of a regular cylindrical form, interspersed upon the knotted ones. The cylindrical fibres are about $\frac{1}{120}$ th of a line in diameter.

The cortical substance seems, according to Ehrenberg's observations, to differ from the medullary or white, chiefly in the want of the straight cylindrical fibres, and the articulated fibres contained in a dense network of blood-vessels, and being covered by a layer of free granules, larger than the dilated parts of the knotted fibres.

The cylindrical fibres are tubular, containing a granular medullary matter; the articulated ones do not appear to be so.

The optic, olfactory, and auditory nerves, are composed of the articulated fibres, while those of motion are clearly cylindrical, but seem to be continuous with the articulated fibres of the brain and chord; the structure of the nerves of ordinary sensation is not so clearly ascertained.—*Samuel Solly On the Brain, p. 7*.

XXV.—ON THE SILICIOUS BODIES OF THE CHALK, GREENSANDS,
AND OOLITES.

By *J. S. Bowerbank, Esq., F.G.S.*

[Continued from page 103.]

THE perpendicular and oblique veins of flint, found in the chalk cliffs between Brighton and Rottingdean, and described by Dr. Mantell, present precisely the same internal characters as the tabular flint and the common tuberous nodules. The external characters are also similar to those of the tabular flint. If we observe these veins *in situ*, we shall frequently perceive, that the whole of their substance is not of uniform density, but that there are often, near the middle of the vein, parts where the two interior surfaces have not united, and that the spaces are generally filled with chalk. If this chalk be carefully removed or dissolved by diluted muriatic acid, the internal surfaces present the same appearances which have been described as characterizing the exterior of the ordinary flint nodule; and the aspect of the whole is precisely such as we should expect to find, if the two sides of a fissure in a rock were covered by our common fresh-water sponge, or one of similar habits; and the two outer surfaces had been built towards each other, and had joined in some parts, while in others they had approached, but had not united. The sides of these flint veins are not studded with numerous species of *Foraminifera*, like the under surface of the tabular flint, but from the position in which the flint veins have been built, it is a natural consequence that this should not be the case.

Having thus satisfied myself that the common tuberous flints, the horizontal tabular flints, and those forming perpendicular or oblique veins, were all produced by the same agency; and having observed the frequent occurrence of the partial imbedment of shells and other extraneous bodies, I was naturally led to infer, that in all probability the interior casts of *Echinites* and similar bodies, which are frequently found to be filled with flint, were also produced by the same agency; I therefore procured numerous specimens of silicified Echinodermata, and their examination strongly corroborated this supposition. Some of them were not entirely filled with flint; in one case a small portion only was silicious, in others two-thirds or three-fourths of their interior were so occupied, while the remaining space was filled with chalk. Upon clearing away the chalk from this part of the specimen, the flint never

presented an even surface, such as would have been produced had a portion of fluid matter entered though the ambulacra and subsided, as water or any similar liquid would have done; but, on the contrary, the surface was always undulated, and frequently projected considerably above the surrounding parts, more especially near the side of the shell, against which it was frequently built in semi-cones or columns, and in the space thus unoccupied by the flint there was always included one or both of the large orifices of the shell. The undulated surface of the flint thus concealed within the Echinite, presents exactly the same organic characters which are observed on the flint nodules. Most frequently the Echinite is filled with the flint; and the animal having thus built its prison full, has usually perished from want of sustenance; at other times it has survived this incarceration, and has grown out of one or both of the great orifices of the shell, and has then, in some cases, increased to a very considerable extent. On the exposed surface of the whole of these, whether it be only to the extent of a slight convex projection from the orifice of the Echinite, or to a considerable mass, an accordance will be found with the organic characters before described.

If some of the specimens of *Galerites* and *Spatangus*, which are filled with flint, be placed in diluted muriatic acid, and the whole of the shell be removed, the appearance presented by the silicious casts will still further corroborate the opinion of their spongy origin. Occasionally it will be found, that the ambulacral orifices of the shell have been filled with fine threads of silex, and that these are based upon the cast; but more frequently we shall find, that opposite to each of these numerous minute orifices, there is a small but deep depression, the interior of which presents the usual characteristic surface observed on all flints, and the minute tubuli will be seen as boldly projecting at the bottom and round these small excavations, as upon any of the exposed surfaces of the flint. In these cases the ambulacral orifices of the shell have evidently been used by the sponge as so many inlets to admit the streams of water which were necessary to its existence; and the depressions thus produced directly beneath them, were clearly intended as a means of facilitating this operation. On the surface of the cast, in the immediate neighbourhood of the two large orifices of the shell, there is frequently a series of channels, which have evidently been left by the sponge for the same purpose as the depressions opposite the ambulacral pores, and the bottoms and sides of these channels exhibit the sponge tubuli in a like manner.

It frequently occurs in the *Echinites* which are filled with flint, that portions of the shell have been replaced or infiltrated with siliceous. In all these cases that I have seen, the siliceous presents a stalactitical or chalcedonic form, and never exhibits the spongy texture. Very frequently, however, thin laminae of spongy texture are found to have been built between the plates of the Echinite, where they have happened not to have been quite in contact; and in these laminae the tubuli are as beautifully distinct as in the most favourable portions of the mass of the cast. If the surface of the cast be microscopically examined, we shall frequently observe that the flint has not been in such a state of contact with the shell as a cast from a fluid material would be supposed to present; for although the boundary of each plate is well marked, the areas of their impressions exhibit such a view of the tubuli of the sponge as we might naturally expect to find where numerous minute tubes have been built against a flat or slightly concave surface. Sometimes the sponge has grown round the interior of the shell, and has left a hollow near its centre; and occasionally the sponge appears closely approximating, yet not quite adhering, to the inner surface of the Echinite. In these cases, a thin film of chalcedony is frequently spread over the organized surface of the sponge, which, in a specimen in my possession, is in several places to be seen through small breaks in the film.

(To be continued.)

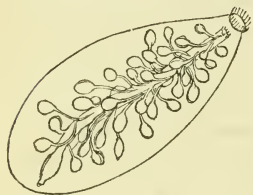
XXVI.—AN ABSTRACT OF THE “INFUSIONSTHIERCHEN” OF
EHRENBURG.—No. 2.

By *W. Hughes Willshire, M.D., M.B.S., Physician to the
Fore Street Dispensary, &c.*

THE Infusoria are divided by Ehrenberg into two great classes, *Polygastrica* and *Rotatoria*. The *Polygastrica* are characterised by having their intestinal canal provided with numerous digestive sacs, or stomachs, and by their non-possession of a true rotatory apparatus. The *Rotatoria* are distinguished by their intestinal canal being simple, and by their possession of peculiar ciliated organs, by means of which they perform certain rotatory movements. The following are the characters of the Class *Polygastrica*, to which is added a Synoptical Table of the Families.

Class I.—POLYGASTRICA.

Invertebral animals having no pulsating vessels; the intestinal canal provided with numerous globular digestive sacs, or stomachs; motion performed by pediform processes (very often vibrating), no true articulated feet being present; hermaphroditic. Form of body indefinite, from its property of increasing by gemmæ and spontaneous self-division.

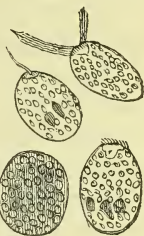


Intestinal Canal not definable, nor distinct from the digestive sacs, or stomachs.— <i>Anentera</i> .	Body devoid of appendages (no pediform processes) <i>Gymnica</i> .	Form of body constant	Self-division perfect or complete	Illoricated MONADINA.	
				Loricated. CRYPTOMONADINA.	
			Self-division imperfect or incomplete (hence clustering)	..... VOLVOCINA.	
				..... VIBRIONIA.	
				..... CLOSTERINA.	
	Form of body varying.	Illoricated	.....	ASTASIAE.	
		Loricated	.....	DINOBRYNA.	
	Pediform Processes, varying. <i>Pseudopoda</i> .	Illoricated	.....	AMEBÆA.	
		Loricated	A compound pediform process from one aperture		ARCELLINA.
	A simple pediform process from one or each aperture		BACILLARIA.		
Hairy. <i>Epitricha</i> .	Illoricated	.....	CYCLIDINA.		
	Loricated	.....	PERIDINÆA.		
Intestinal canal distinct and definable. <i>Enterodela</i> .	Having but one orifice both for the reception and discharge of nutritious matter.— <i>Anopisthia</i> .	Illoricated	... VORTICELLIA.		
		Loricated	... OPHRYDNINA.		
	Having an anal and an oral orifice, one at each extremity.— <i>Enantiotreta</i> .	Illoricated	..... ENCHELIA.		
		Loricated	..... COLEPINA.		
	Orifices not terminal (oblique or varying) <i>Allotreta</i> .	Illoricated	Mouth furnished with a proboscis; tail not present		TRACHELINA.
			Mouth anterior, tail present ...		OPHRYOCERCINA.
	Orifices ventral. <i>Catotreta</i> .	Loricated	.....	ASPIDISCINA.	
		Illoricated	Locomotive organs—Cilia		COLPODEA.
			Locomotive organs—various		OXYTRICHINA.
		Loricated	.....	EUPLOTA.	

FAMILY I.—MONADINA.

Polygastric animalcules having no distinct intestinal canal, lorica, or appendages; body uniform and constant in shape, dividing by spontaneous self-division not only into two portions, but by cross division into four or more.

All self-moving little bodies discoverable in water by the aid of the microscope, destitute of feet, hairs, bristles, or other external appendages; possessing no special gelatinous, membranous, or hard covering, like a lorica, but provided with internal digestive sacs, or stomachs, without a distinct intestinal canal uniting them together; not clustering in a chain, but sometimes appearing as if double, from the constriction of self-division, or from decussating constrictions, as if composed of four portions, or even-looking, like a mulberry; and whose globose, oval, or elongated bodies, during rest or motion, show no voluntary change of form: belong to the family Monadina. The following is a Synoptical Table of the *Genera*.



Tail not present.	Lip not present	Swimming	Eye not present	Solitary	MONAS.
				Aggregated {	voluntarily .....	UVELLA.
			through self-division		POLYTOMA.
			Eye present {	Solitary {	Proboscis one or two	MICROGLENA.
		Proboscides many.....			PHACELOMONAS.
	Aggregated.....	GLENOMORUM.			
Rolling.....	DOXOCOCCUS.				
Lip present	CHILOMONAS.				
Tail present	BODO.				

XXVII.—ON THE STRUCTURE AND USES OF THE STOMATA.*

By Thomas Williams, M.B., M.R.C.S., Lecturer on Forensic Medicine, &c.

THE ultimate organization and functions of the Stomata of Plants have long formed the subject of hypothesis and dispute among high authorities in vegetable physiology.

The best informed of the earlier observers regarded them as follicular pouches of the epidermis, through which the aqueous portions of the elaborated sap were exhaled. In his more recent work, it is stated by De Candolle, that they constitute the spaces where the spiral vessels end, and through which the latter obtain their supply of air; and hence has probably originated the title of "breathing holes," under which they are popularly known. By many modern botanists, they are described as definitely organized openings leading into cavities which freely communicate with the spaces between the cells of the parenchyma. There are not wanting others, by whom the *patulous* state of the stomata has been denied, who consider them to be closed by a membrane, described as a continuation of the epidermis, and which from its delicacy and transparency is invisible under ordinary circumstances. The mode adopted by the Rev. Mr. Reade to render evident this pellicle under the microscope, consists in charring the leaf to be examined, between two pieces of glass. Anxious to determine practically the relative merits of these conflicting observations, I submitted the leaves and green parts of several plants to this charring process; and unquestionably succeeded in rendering appreciable, in many instances, the existence of a pellicle over the stomata. But in order to be certain that this membrane was not the result of heat employed in preparing the leaf, of which I had some suspicion, I contrived a modification of the process suggested by the Rev. Mr. Reade. After having determined, by repeated observation, that *some* of the stomata in the spathe of the garden rhubarb *appeared open*, it was immersed in warm water, after which air was gradually forced into the parenchymatous interspaces, under the receiver of an air-pump,—the success of the injection being indicated by the extrication of minute bubbles of air from the inferior surface of the leaf. The escape of the air was evidently made through the stomatal orifices

* Read at the Microscopical Society of London, August 18, 1841, and communicated to that Society by the Editor.

—this, at least, is the probable inference—and if admitted, a proof is afforded of the *open* condition of the stomata. The *injected* leaf was then carbonized between plates of glass, and again examined with reference to the condition of the stomata. Surprise was excited when, notwithstanding the proof of the patency, as presented by the escape of the infused air, a pellicle over the stomata, darkened by the charring as in the uninjected leaf, was observed under the microscope. This similarity of result, obtained by processes of experiment essentially different, establishes the correctness of my former suspicion, that the membrane is generated in the preparation of the leaf. Nor is this circumstance difficult of explanation, since in all plants a gummy substance, called by the Germans *Phycomater* or organic mucus, covers the surface and even the cells of the stomata and parenchyma; constituting, according to the more recent observations of Schwann, the materials out of which cells are originally formed. In reference to the stomatal pellicle, therefore, in the lamina of a fully developed leaf, the explanation is most probable which supposes that the air which, always in minute quantities, occupies the intercellular spaces, dilating under the heat of charring, acquires force enough to carry before it a bubble of this mucous substance, the summit of which becomes carbonised when brought into contact with the heated glass. By adhering to the margins of the aperture, it thus presents the appearance of continuity with the surrounding epidermis. In the examination of stomata generally, however, it should be remembered, that in some species of plants this mucous covering assumes the form of a universal cuticle, and by its induration over the stomata forms a distinct unorganised membrane.

After having multiplied to a few additional instances the observations, of which the results are just stated, it became evident that the stomatal organs, even in a limited portion of cuticle, exhibited different characters. By carefully detaching the epidermis from the stem of the *Tradescantia*, the stomata could be distinguished in a perforate condition, without any variation either in the figure or diameter of the orifices. In making, however, a comparative examination of portions of cuticle stripped from the inferior surface of a maturely formed leaf at the base, and from a small expanding bud at the summit of the stalk, differences in the form of the stomatal organs were again recognised. It was not until my examinations had been extended to several other plants, that I associated these varieties with differences in the *age* of the leaf from which the cuticle was taken for inspection. On the young and old leaves of the *Anchusa angustifolia*, and still more strikingly (if the

cuticle, which is dense, be shaved off with a sharp, thin scalpel) on the buds and expanded leaves of the *Ficus elastica*, when contrastively examined, the following distinctive features can be readily determined. Previously charred, the cuticle from the younger leaves will present stomata, which consist of two or more elliptically disposed vesicles, enclosing apparently a membrane, darkened by the charring, which can be distinctly observed to be bisected by a diaphanous line longitudinally traversing the oval space of the stoma. These appearances can likewise be distinguished in the uncharred cuticle, with the difference, however, that the membrane here appears more like flattened cells, studded in their interior with granules of chlorophylle, which impart to the oval space a shaded or dark character; and this latter circumstance explains away the error of the idea which some microscopists have entertained, that the dark appearance is caused by the presence of air in the cavity beneath. In the epidermis of the older leaves, on the contrary, charred or uncharred, unequivocal perforations can be discovered bounded by transparent vesicles. Between these two extremes of the foetal and adult formations, numerous intermediate conditions are presented. The transparent line, which I have satisfied myself to be a fissural aperture between the two apposed, darkened vesicles, with advancing development, acquires greater breadth, until ultimately it assumes the character of an oval orifice. By comparing the stomates on the bases and apices of the leaves of the *Hyacinthus orientalis*, the distinctions here indicated may be conclusively determined. Subsequently to the settlements of these points, my attention was directed to the observations of M. Hugo Mohl* on the development of these organs, in which allusion is made to the views of M. Mirbel.† While no positive statement is made in regard to the persistent condition of the stomata, it may be obviously seen that the account which is here presented, derives confirmation from their labours. These observers conducted their examinations upon the leaves of the *Marchantia polymorpha*, stalks of Gourds, and on the cuticle covering the articulations of *Tygnema*. Although their opinions are somewhat different, they agree upon the principle, that the orifices of these organs result from the graduated separation of the vesicles, which are nothing more than ordinary epidermoid cells, modified into a specific form. These facts, then, obviously point to the general inference, that the normal condition of the stomata is that of complete perforation, and that when the ap-

* Annales des Sciences Naturelles, 1840, p. 222.

† Comptes Rendus, Tom. iii., p. 568.

pearance of an overlying membrane, *without* a central chink, is remarked, its adventitious formation may be inferred.

Whatever may be the difficulty of circumscribing into a definite function, the process of respiration in vegetables, physiologists can no longer doubt the tendency of facts in relation to the use of the stomata. It suggested itself to me, that if some expedient were contrived to suspend the functions of the stomata, a sort of negative or pathological evidence might be obtained in regard to their uses. The most effectual means, after some trials, were found in common varnish. If the *superior* surface of an aquatic leaf, to which it is known the stomata are confined, be well coated with varnish, after the lapse of a few days a distended, unhealthy, and ætiolated state will supervene. Under the conditions of this experiment, it is evident that two important consequences follow:—That, firstly, the process of exhalation is rendered impracticable by the impervious coating, inducing thus an undue retention of water in the Parenchymatous cells; and that, secondly, since the decomponent agency of the light continues, the liberated oxygen is equally retained, and, if the diseased appearance of the leaf be admitted as criterion, proves deleterious to its organism. Time and opportunity have not allowed me to correct and multiply these observations. So far as my acquaintance with botanical literature extends, I am not aware that this mode of experimenting upon the stomata has been anticipated. From various physiological considerations, the accuracy of the analogy cannot be doubted, which makes the stoma to the pneumatic or respiratory system of the plant, what the spiracle is to the tracheal apparatus of the insect. Although the former description of M. De Candolle, that the spiral-vessels communicated by open mouths with the stomatal cavities, has been denied by high authorities in modern phytology, from the experiments of Dutrochet, Dumas* and Dr. Boucherie, it is obvious that the spiral-vessels derive their supply of *atmospheric air* by means of the stomata. In the leaf of the Holly, which, upon maceration, separates into two layers, I have satisfied myself that the spiral-vessels accompany only the excurrent woody fibres, and are therefore confined to the upper lamina of the leaf. A parallel to this arrangement is found in the structure of some insects, in which the tracheal tubes follow *only* the centrifugal currents of blood. In the Holly, therefore, the communication with the stomata at the inferior surface, can only be indirectly through the intercellular passages.

* Comptes Rendus de l'Academie des Sciences, 1840.

Extracts and Abstracts from Foreign Journals.

[From the *Annales des Sciences Naturelles*.]

C. Montagne on the Nucleus of Sphærophoron.—The apothecium of this genus of Lichens is at first only an elliptical expansion of the extremity of a division of the plant. If, in this state, a longitudinal section be made, the cavity will be found to be occupied by the nucleus, which is of a diagonal form. This circumstance is owing to a hemispherical projection of the medullary or central layer of the thallus, representing a kind of torus, from all parts of which, tubes, bearing sporidia or thecæ, diverge. The upper part of the sporangium is already filled with this scobiform substance altogether different from the sporidia, the colour of which is of a beautiful blue or transparent indigo, but which appears very black when in a mass; the thecæ and sporidia are tinted of a like shade, but for the most part paler. By degrees the cavity enlarges, not only by the increase of the extremity of the branch, but still more by the insensible depression of the internal projection formed by the medullary layer of the thallus.

The nucleus contained in the apothecium differs but little from that of other Lichens. It is composed of straightened filaments, pressed one against the other, exactly as in the proligerous plate of a Lecidea, and united together by the intervention of a mucilaginous substance, a ready absorbent of water. These tubular filaments, closed at their free extremities, have absolutely the form of *asci* or utricules of a *Peziza*. They are linear, obtuse at the summit, and contracted into a short pedicel at their base, which appears to be the continuation of the filaments of the medullary layer. In their young state, they are perfectly transparent, and contain an opaline moisture (*humeur*) in which appear hereafter transparent globules. They are only to be seen by readjusting the focus of the microscope. In a short time these filaments, which can only be considered as true thecæ, take on a bluish tint, becoming more intense by age, preserve always the sky blue colour when viewed by transmitted light.

The sporidia become also more and more apparent in the thecæ: whether globular or oblong, they are arranged in a single row. At length, the theca is about to burst; they remain free, and mix with the mass of black dust, from which they are nevertheless distinct, and which is very difficult, at least for Dr. Montagne, to determine the origin, for it exists from the very first formation of the apothecium.

The theca is from five to six hundredths of a millimetre in length, by a two-hundredth in diameter. The sporidia, which are quite spherical, or rather longer than they are wide, acquire, when free, about the $\frac{1}{100}$ th of a millimetre in diameter. The sporidia are surrounded by a transparent expansion (*limbe*) and are, like the thecæ, of a blue colour.—*March 1841, p. 149.*

Agassiz on the Structure of the Scales of Fish.—M. Mandl considers that I am mistaken in affirming, that *the scales are composed of super-*

posed plates; he asserts, on the contrary, that they are formed of *juxtaposed cellules*. He endeavours to show it in the scales of *Locha*; and yet, in the same fish, I have succeeded in separating the plates, as they grow one upon the other; and in numerous transverse sections of different scales, I have seen, with a power of 250 diameters, the superposition of these plates throughout the whole thickness of the scales; I have even published a figure of a similar section of the scale of *Salmo Trutta*, in my *Histoire Naturelle des poissons d'eau douce*.

Mandl further affirms, that the diverging traces on the surface of the scales, which I have described as *furrows*, are true *canals*. I can scarcely imagine that Mandl has mistaken the middle tubes of the scales of the lateral line (which ramify occasionally at their posterior extremity) with the furrows of their surface; this would be imputing to him too gross an error; nevertheless, I cannot see (*entrevis*) any other explanation to that which he advances; but that which I can positively affirm is, other scales never have canals in their surface, but furrows, compressed from above, which are prolonged to the margin of the superior layer of growth to the edge of the next inferior layer, as is evidently seen in all transverse sections that can be made in any scale offering similar traces.

Mandl is of opinion, that the toothings on the posterior border of pectinated scales are not *notches of the borders of the plates*, but *true teeth, having a root enveloped in a sac*. It is quite sufficient to examine the scales of *Sciena*, which Mandl cites as an example, in adjusting successively the scale by the focus of the microscope, to be convinced that all this apparent dental apparatus depends on optical illusions, resulting from the difference of thickness of these dentations at their base and at their point; and that in truth, the points which tooth the posterior border of the scales of fish, which I call *Ctenoidæ*, are simply the result of *notches*, more or less deep at the border, and not detached teeth.

Lastly, Mandl appears to be unacquainted with the existence of enamelled scales, which differ materially in their structure from those of ordinary fish, and are found in an order, of which the greater number of species are extinct, and to which I have given the name of *Garoidæ*. To these, and other remarks, M. Agassiz concludes, *from his new observations, that the description he has given on a former occasion is exact, and that the manner in which M. Mandl examined the same, is erroneous in every respect*.

To this Mandl replies in a succeeding Memoir, that:—1. The parts of the scales which I call *teeth*, are not, as M. Agassiz observes, the result of an optical illusion; I can show their existence to the Commission.—2. The *canals*, of which I have spoken assuming different forms, do not exist, according to M. Agassiz: the Commission may convince themselves that they really do exist.—3. I have nowhere stated the opinion attributed to me by M. Agassiz, that the scales are formed of *juxtaposed cellules*; I have, on the contrary, shown the presence of *two different lamellæ*; I speak, as may be seen in the analysis of my memoir inserted in the *Comptes Rendus* of the sitting of the 24th June, 1839, of *superposed lamellæ in an inferior fibrous layer*, and of *cellules*

only in the lines which are found on the surface of the superior layer of the scale. M. Agassiz has then fallen into a great error relative to the manner in which I examined the structure of the scales.—*January*, 1840, p. 58, 62.

[From the *Comptes Rendus*.]

Infusoria of Rock Salt.—M. Marcel de Serres communicated a note on the subject of the observations which he is making along with M. Joly. In the specimens of rock salt of a tolerably decided greenish colour, brought from Cardona (Spain), the Infusoria appear more rare, of a smaller size, and less distinct than in the specimens of a red colour before examined.

This, says M. Marcel de Serres, finds an explanation in M. Joly's previous observations on the change of tint, which the Infusoria that colour our salt marshes undergo by age. These animalcules, which are white at their birth, become green in their middle age, and do not till their adult age take the purple tint which makes them so remarkable. In general, the green Infusoria are not so often seen as the red in salt marshes, which seems to indicate that these *monades* remain but a short time in their middle state.

We have found the same Infusoria in the Argilo-calcareous marls, which are found at Cardona beneath the rock salt. In this locality they have their beautiful purple tint, but they are in too small numbers to communicate it to the mass of marl, which is of a greyish hue. This fact also proves, that in the ancient world, as in the present, the animalcules were precipitated after death to the bottom of the waters in which they had previously lived.—*March* 16, 1840.

Theory of Digestion, &c.—The Royal Academy of Sciences and Belles Lettres at Brussels, offers a prize for the best essay on this subject; embracing, more particularly, a microscopic examination of the chyme, and to determine the relation which subsists between the parts composing the chyme and certain aliments; such as albumen, gelatine, milk, and its products, &c.

The prize offered by the Academy, is a gold medal of the value of 600 francs. It is requisite that the memoir be legibly written in Latin, French, or Flemish, and that it be forwarded, free of expense, before the 1st of February 1842, to M. Quetelet, Perpetual Secretary to the Academy.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

August 18th.—R. H. Solly, Esq., F.R.S. &c., in the Chair.

A PAPER was read by Mr. John Quckett, 'On the Anatomy of four species of Entozoa of the genus *Strongylus*, from the *Delphinus Pho-*

cæna, or Common Porpoise.' The subjects of the present communication, with one exception, were found in the lungs of the porpoise. Two of them have been long known, and described by Rudolphi, Klein, and others, under the names of *Strongylus inflexus* and *S. minor*, whilst a third, from the circumstance of its being found in company with the *S. inflexus*, has, by many observers, and by Rudolphi particularly, been considered as a younger specimen of that species; and the fourth appears hitherto either to have escaped notice, or else to have been confounded with the last. The author's examinations of this Entozoon lead him to consider it as a distinct species, and from certain peculiarities he has named it *S. invaginatus*. The largest mentioned was *S. inflexus*; this species occurred most abundantly in the bronchial tubes, and in such numbers as almost to close them up, but many specimens were found in the right ventricle and auricle of the heart, and in the principal blood-vessels of the lungs as well. The average length of the male is about seven inches, whilst that of the female is nine inches. Our space will not allow us to enter into the minute anatomical details, which will doubtless be published elsewhere. The next species was found in common with the last, being twisted together in a knot around them, both in the bronchial tubes and blood-vessels; it has been noticed as the young of *S. inflexus*, but on comparison the author finds that the difference between the two is so marked, as to leave no doubt of their being distinct species. Kuhn has described it as *S. convolutus*. The third species is the smallest of the whole, and from this circumstance has been named *S. minor* (Quekett). It occurred in the venous sinusses of the heart, and in the cavity of the tympanum, and from living in blood they were of a reddish hue. The fourth species was found on the surface of the lung of a porpoise, the pleuritic investment of which was raised into little tubercles about the size of a small pea; and on cutting into one of them five very long and slender white worms were drawn out, one being much shorter than the rest, which was subsequently ascertained to be the male. On tearing a portion of the lung a vast number of these cysts were found imbedded in its substance, and in each one there were several worms coiled up in a very small compass; the cysts could be readily torn away quite entire from the surrounding tissue with the worms in them. After describing and detailing the structure of the male and female of each of the species above noticed, the author concluded the paper with alluding to some curious facts which present themselves for consideration. Entozoa, from the time of their first discovery to the present day, have exhibited more astonishing and wonderful phenomena than any other tribe of animated beings, and perhaps, throughout the whole kingdom of nature, no class has been so frequently the subject of opposite opinions, and on the matter of their generation we are now nearly as much in the dark as ever. In the various specimens mentioned above, there is, however, the startling truth of one and the same species of Entozoon living in such opposite media, viz., in blood and in air; for it has been above stated that *S. inflexus* was found in the bronchial tubes in the principal blood-vessels of the lung, even in the heart itself, in the venous sinusses at the base of the brain, and the cavity of the tympanum were literally

clogged with the *S. minor*. Now it cannot but be imagined that any animal so infested must, as a necessary consequence, have both the functions of respiration and circulation greatly impeded. Three porpoises examined by the author within the last three months have all had Entozoa, and these were all taken in the Thames; and the author considers it probable that this may be the reason of their leaving the ocean and running up the rivers at particular seasons of the year, and it would be curious to ascertain whether those taken at sea about the same period were so infested. The author considers also that some light may be thrown on the occurrence of Entozoa in particular parts of an animal, when they have been actually found living in the blood; and it may also be now readily imagined how the young, when emitted from the parent, can be transported to all parts of the body by means of the circulation, and analogy would lead to the conclusion that the blood of other animals may contain Entozoa as well as that of the porpoise. Another curious circumstance connected with these *Strongyli* is, that all the specimens of the four species are nearly uniform in their size; no young ones having been met with amongst them; these probably are yet to be found in other parts of the body, where the scrutinizing eye of the anatomist has as yet failed in detecting them. The paper was accompanied with drawings, showing the anatomical details described by Mr. J. Quekett.

A communication was then read from Dr. Thomas Williams, in which it was shown, that under natural circumstances the stomata are *openings unclosed* by membrane, as it was attempted to prove by the experiments of the Rev. Mr. Reade. This paper is inserted entire at page 118 of the present number.

Mr. Andrew Ross exhibited to the meeting his "Educational Microscope," an account of which was given at page 111 of our last number.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

August 5th, 1841.—Sir Henry Marsh in the Chair.

THE minutes of the last meeting having been read, the Secretary informed the Society, that he had received a letter from Mr. Bergin, one of the members, in which he requested him to read before the present meeting, some notes relative to a curious animal, which had lately fallen under his notice for the first time. The notes were accompanied by four or five pen-and-ink etchings.

Mr. Bergin's communication was then read by Dr. Hill. In it he directed the attention of the Society to the beautiful though complicated organization of a small animal, which he believed to be a *hirudina*, though he was unable to give it a name, or to say to what species it belonged. He had found it in some water taken from a ditch in the Phoenix Park. One of the most striking peculiarities of this animal was the mode of its carrying its young; they were ten or twelve in number, and were attached by one extremity to the lower surface of the posterior third of the body of the parent animal; each pos-

sessed considerable extensile and retractile powers, and the whole presented much the appearance of a cluster of the tentaculæ of a polyp. The author described minutely the internal organization, mode of progression, and other peculiarities of the animal, and strongly recommended the members of the Society to make search for additional specimens, assuring them that they would be amply repaid by an inspection of this very curious and interesting creature.

Mr. Calwell exhibited a specimen of the animal described by Mr. Bergin, prepared in balsam: he stated, that he had more than once met with it, but was unacquainted with its name and history.

Dr. Hill mentioned, that a few days since, a specimen of the same animal had been given him, which was obtained from a pond in the county of Meath; and that, being unacquainted with it, he had forwarded it to Mr. Bergin, who happened to be engaged at the very time in inquiries relative to the same creature.

Dr. Hill then read a brief notice of some peculiar appearances exhibited at this season of the year by diseased wheat, when examined under the microscope.

Microscopical Memoranda.

Micrometers.—For the sake of those of our readers interested in the use of these instruments, we find in the *Bulletin de la Société Imperiale des Naturalistes de Moscou*, No. 3, Année 1837, a paper by Professor Alexandre Fischer, “On the advantages of Micrometers in the Focus of the Eye Piece of Compound Microscopes, and on the mode of placing them;” but as our space does not allow us to enter into the details and formulæ, which occupy twenty-six pages, we must rest satisfied with referring only to the above quotation.

On Microscopic Vegetable Skeletons found in Peat, near Gainsborough, by Mr. Binney, of Manchester.—Mr. Bowman read a paper at the last meeting of the British Association on some skeletons of fossil vegetables, found by Mr. Binney, in the shape of a white impalpable powder, under a peat-bog near Gainsborough, occupying a stratum of four to six inches in thickness, and covering an area of several acres. It remained unchanged by sulphuric, hydrochloric, and nitric acids, and by heat, and was concluded to be pure silica, in a state of extremely minute subdivision. On submitting it to the highest power of the compound microscope, it was found to consist of a mass of transparent squares and parallelograms, of different relative proportions, whose edges were perfectly sharp and smooth, and the areas often traced with very delicate parallel lines. On comparing these with the forms of some existing *Confervæ* of the tribe *Diatomaceæ*, which are parasitical on other *Algæ* both marine and fresh water, but so minute as to be individually invisible to the naked eye, the resemblance was found to be so strong as to leave no doubt of their close alliance, if not perfect identity. Mr. Bowman considers them to be the counterparts of the

fossil Infusoria of Ehrenberg, and occupying the same place in the vegetable kingdom as those do in the animal.—*Ninth Report Brit. Assoc.* 1840.

Are the Closteriæ Animals or Plants? — Ehrenberg enumerates the following reasons for considering the *Closteriæ* as belonging to the animal kingdom. They enjoy voluntary motion, they have apertures at their extremities, they have projecting permanent organs near the apertures, which are constantly in motion, and they increase by horizontal spontaneous division. Dr. Meyen, who was of the opposite opinion, mentions, as the most important observations in favour of their vegetable nature, that their structure is exactly similar to that of the *Confervæ*: their formation of seed, and the development of this seed, is like that of the *Confervæ*. The occurrence, moreover, of amylum in the interior of the *Closteriæ*, with which they are frequently nearly filled, is a striking proof of their being plants; they have no feet. What Ehrenberg regards as such, are molecules, having a spontaneous motion, which occur in great number in *Clos. Trabecula*, and quite fill a canal the whole length of the plant. Their function is difficult to determine, but they also occur in very many *Confervæ*, and may perhaps be compared with the Spermatozoa of plants.—*Ann. Nat. Hist. Vol. IV*, p. 71.

Griffiths on Ephedra. — He is of opinion, that the ovulum is, as described by Mr. Brown, naked. The first species referred to had a very silicious stem, without stomata, unless certain discs blocked up with some hard matter (silex?) are to be so considered; this he believes to be the correct view, inasmuch as the other species, which has no silicious deposit, has stomata of the ordinary structure arranged in a similar manner.—*Proc. Linn. Soc.* 1841.

Diameter of the Globules of Human Blood. — For the sake of reference, we insert the measurements of the globules of the human blood, given by various observers: —

Hodgkin	$\frac{1}{3000}$	of an inch.
Jurine	$\frac{1}{5240}$	.....
Jurine, in a 2nd measurement	$\frac{1}{1940}$	.....
Bauer	$\frac{1}{1700}$	.....
Wollaston	$\frac{1}{5000}$	.....
Young	$\frac{1}{6060}$	.....
Kater	$\frac{1}{4000}$	.....
Ditto	$\frac{1}{8000}$	.....
Prevost and Dumas	$\frac{1}{4076}$	.....

The thickness of the particles, which is perhaps not so uniform as the diameter of the discs, is on an average to this latter dimension, as 1 to 45.—*Hodgkin and Lister's Micros. Observ. on the Blood, &c., Phil. Mag. Vol. II*, p. 133.

XXVIII.—ON THE MINUTE ANATOMY OF THE LARVA OF
ANTHOMYIA CANICULARIS.*

*By Arthur Farre, M.B., F.R.S., &c., late Secretary to the
Microscopical Society of London.*

IN this communication, Dr. Farre gave a detailed account of the anatomy of this rare parasite of the human body, only two previous instances of which he believes to be on record. His object was, however, briefly to describe its minute anatomy, with a view of showing the peculiar adaptation of its organs, particularly those of the digestive system, to the circumstances in which it is thus occasionally placed.

After alluding to, and detailing the instances on record of the existence of this parasite in man and the boa constrictor, which appears to have its analogue in the *Æstrus* or *Bot* of the horse and sheep, he proceeded to describe the larva, which is about half an inch long, by about one-eighth of an inch in breadth, of a dull brown or blackish colour, soft, flexible, and having a tough integument, which, however, is sufficiently transparent to allow the alimentary canal to be seen through it. The body consists of eleven segments, but the last is evidently formed of three blended in one. Each segment carries a pair of feathery appendages, which project at right-angles from the body, constituting a double row on either side. There is also a double row of smaller eminences extending down the dorsal surface, but the abdominal surface is nearly smooth. The lateral appendages, of which the upper series is formed, are much larger, and are pinnate; the central shaft of these, which is long and pointed, is hollow, and communicates apparently with the tracheæ. The lateral pinnæ are again pinnated on their outer margin. The integument, which appears smooth to the naked eye, is found, when examined under the microscope, to be granulated all over with minute dentiform or pointed processes, which appear to be of a harder nature than the rest of the tegument, and resemble, on a small scale, the osseous prominences in the tegument of certain cartilaginous fishes, as the sturgeon; and it appears to be only an extraordinary development of these little processes, which constitute the long feathery appendages already described.

The mouth of the larva is perhaps the most interesting part of its ana-

* Abstracted from the paper read before the Microscopical Society of London, April 28th, 1841.

tomy. The head is furnished with two broad fleshy lips, which together constitute a broad disk, having in its centre a minute aperture, leading to the œsophagus, and flanked on either side by hook-shaped mandibles, the sharp points of which are directed downwards and somewhat outwards, every one can be nearly retracted into a separate sheath, the aperture in the extremity of each just allowing the point to protrude. Each of these broad fleshy lips is crossed by transverse parallel plaits or folds of membrane, about twenty-five in number, which, on their free margin, exhibit a delicately notched appearance, and in fact in every particular resemble a similar structure which is seen on a larger scale in the sucking disc, situated upon the dorsum of the head of the *Remora*, by which that fish is enabled to attach itself firmly to various objects. This structure, though similar to the instance just cited, is invisible to the naked eye. Dr. Farre imagines that this sucker enables the larva to fix its head, so as more readily to insert its hook-shaped mandibles into the soft mucous membrane of the intestine which it inhabits, and from which it draws its food. The mandibles are placed parallel to each other, with their hooked points directed downward, so as more easily to be inserted. They consist of three portions on either side. The first is hooked and sharp pointed, measuring only the $\frac{1}{60}$ th of an inch in length. It is nevertheless furnished at the base with a delicately shaped ball, adapted accurately to a socket in the second joint, and has projecting from either side of its base a sharp spine or trochanter, for the insertion of the tendons of the abductor and adductor muscles, by which its movements are effected. The second joint bears the socket, to which the ball of the first is adapted, and at its opposite extremity it is united to the third and principal portion of the jaws, which consists of a broad expanded corneous plate, of less density than the preceding, and resembling in form and office a similar structure, well known as occupying the centre of the large claw of the lobster, being for the attachment of the muscles by which the mandibular hooks are moved to and fro. The whole mandibular apparatus measures about the $\frac{1}{10}$ th of an inch in length, and being very fine and solid, presents a remarkable contrast in texture to the surrounding soft parts with which it is connected, and from which it is easily detached.

If the body of the insect be laid open, the alimentary canal is seen to be of considerable length, and much convoluted. It commences by an exceedingly delicate hair-like œsophagus, so narrow that it would appear to be specially destined to transmit fluid nourishments, and nothing else. It terminates about the third segment of the body, in a minute globular cavity, or proventriculus, which is of the same diameter

as the rest of the alimentary canal, and immediately below which four very short salivary vessels enter. From this point commences the large intestiform stomach, which, after contracting in its first third to the finest thread, again dilates, and proceeds of uniform diameter to the point where the four slender biliary vessels enter, where it again contracts, and forms a short intestine. The whole alimentary canal is about six times the length of the body, and of this length the stomach forms about $\frac{5}{6}$ ths. Its greatest diameter does not exceed one-third of a line, and its least is that of a mere thread. The whole structure appears to be that of an animal adapted to live on fluid nourishment.

The only extreme openings to the tracheæ, appear to be two apertures situated on the dorsum of the last segments of the body, and which constitute the last pair of the series of dorsal eminences formerly noticed.

The author concluded by offering some speculations as to the mode in which the larvæ could have obtained admittance into the intestine; the great difficulty being to account for their vast number—some quarts in one case, and several hands-full in another; while it was impossible, from their being in the larva state, and having no generative organs, that they could have been propagated in the alimentary canal. The singular adaptation of their digestive organs to a parasitic life was contrasted with the extreme rarity of their occurrence in those situations in which they appear best fitted by organization, viz., in the intestines of man or animal. As throwing some light upon this point, the singular and important fact which was observed at a period shortly subsequent to these observations, was related, viz., the accidental discovery of some specimens of the same larva, though in a younger state, in some New River water, brought by the usual service pipes, which supply the metropolis with water.

XXIX.—ON THE SILICIOUS BODIES OF THE CHALK, GREENSANDS, AND OOLITES.

By J. S. Bowerbank, Esq., F.G.S.

[Continued from page 115.]

THE results arising from the various forms of flint which have been described, induced me to believe that the flint-cases enveloping the numerous and beautiful specimens of sponges and corals of the Wiltshire chalk, would probably prove to have originated in a similar manner to

the forms of flint before described, I therefore requested Mr. John Baker of Warminster, who collects large quantities of these beautiful fossils, to furnish me with some, the interior surfaces of which had not undergone the usual process of washing and brushing. Having cleaned these carefully, by pouring into them a small stream of water, I observed spicula projecting from all parts of the interior surface; and the same appearance was exhibited to a greater or less extent in more than twenty specimens which I examined, however different in character the sponge or coral enclosed within the flint might have been; the spicula appearing to have no reference whatever to the bodies thus enclosed, none of them being found upon the included body, but only upon the case. When microscopically examined, the interior surface of these flint-cases presented in every respect the same appearance as that exhibited by the under surface of the tabular flints; and there are generally fragments of minute corals, small *Terebratulæ* and other shells attached to the inner surface; and in the same case there are frequently two, and sometimes three, different species of coralline or spongy bodies; thus proving that these beautiful Wiltshire specimens are merely extraneous bodies which have been built over and enveloped by the common coating sponge of the chalk. Many of the contained bodies also present evidence of their having been exposed some time previous to being thus enveloped, as we frequently find upon their surfaces patches of *Flustra*, which are in the habit of seating themselves upon dead or inorganic matter. Thin sections of the cases of the Wiltshire fossils exhibit the characteristic *Foraminifera* and spicula, as well as the common species of *Xanthidia*.

It may be objected to this mode of accounting for the envelopment of sponges and corals by the common casing sponge of the chalk, that the enclosed bodies are usually almost in the centre of the flint, which would not be the case, if they had been dead specimens lying at the bottom of the ocean at the time they were built over; but in reply to this it must be remembered, that although dead specimens, they most probably retained the position in which they lived, until the extraneous mass surrounding them might alter their centre of gravity, when they would fall on one side, and their bases would then, in all probability, be built over in the same manner as the remainder of the mass. In many of these bodies, also, there are portions of the enveloped sponge or coral which have never been invested, and in numerous instances there are orifices remaining in the flint-cases through which the roots of the enclosed body have passed out, and which were probably pre-

served from being built over, either by being buried in the soft mud, or by being attached at the bottom of the ocean.

The tubuli of the flint-sponge are very minute : an average of the measurements of four well-defined tubes upon the surface of a common flint gave the $\frac{1}{1268}$ th of an inch as the diameter ; the smallest of these was the $\frac{1}{1575}$ th, and the largest the $\frac{1}{800}$ th of an inch in diameter. In the cast of an *Ananchytes*, five which were measured gave an average of $\frac{1}{652}$ nd of an inch ; the smallest of these being the $\frac{1}{778}$ th, and the largest the $\frac{1}{510}$ th of an inch in diameter. In the cast of a *Galerites albogalerus*, in which they were in a very beautiful state of development, a measurement of seven gave the $\frac{1}{855}$ th as the average ; the largest being the $\frac{1}{752}$ nd, and smallest the $\frac{1}{980}$ th of an inch in diameter. The tubuli in this specimen were hollow ; and one of them, which had



Fig. 1.

been broken at a right angle to its axis, gave the following measurements : external diameter $\frac{1}{980}$ th, internal diameter $\frac{1}{1852}$ nd of an inch ; thickness of the substance of the tube $\frac{1}{4167}$ th of an inch. In their size and proportion the tubes agree very nearly with those of the recent sponges. The average diameter of the fibre of the common sponge of commerce is about the $\frac{1}{1130}$ th of an inch, and in the sponge from New South Wales the diameter varies from the $\frac{1}{971}$ st to the $\frac{1}{472}$ nd of an inch. The spicula are large in proportion to the other parts of the tissue, very frequently exceeding the eighth or tenth of an inch in length. They are thinly scattered, and usually acicular in their form ; but sometimes they are forked or branched, but this is comparatively a rare character. They do not occur in fasciculi, as in *Halichondria*, but are usually solitary, or a few are grouped together. They are mostly of an elongated, spindle-formed shape and somewhat curved, as represented in fig. 1, which exhibits them in their natural position, on the interior surface of a flint from Wiltshire ; or in fig. 2, which gives a series of the largest of them, separated from the white friable siliceous matter from the interior of one of the Wiltshire flints.

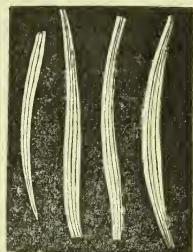


Fig. 2.

The results arising from the examination of the flinty bodies of the chalk, induced me to believe that the cherts of the greensand formations and of the oolites, would probably prove to be of a similar origin.

I therefore examined thin slices of specimens of chert from the upper greensand pits of Fovant in Wiltshire, in the manner pursued in the investigation of the flints ; and I found, as I expected, the result to be of a similar description ; but in this substance the spongy fibre is of a much coarser texture than in that of the chalk-flint, and the interstices of the net-work very much larger in proportion. The imbedded extraneous matters are also of a larger description, such as small fragments of apparently very fine branched vegetables, &c., in addition to *Xanthidia* and other small organic bodies. The form and mode of ramification of the tubular structure approaches nearer to those of the fibre of the common Mediterranean sponge, than in the flint sponge. The tubes are seen dispersed in about an equal proportion through the whole mass of the chert. They are very pellucid, and would probably escape observation, if it were not that their surfaces are covered with a short downy-looking structure, which gives them very much the appearance of minute portions of a very transparent *Fucus*, when viewed as a transparent object with a microscopic power of fifty linear. Sometimes, but very rarely, portions of the tubes remain hollow, and they then display a very distinct and characteristic appearance, which represents a portion of the tubes under these circumstances, as they appear when viewed as opaque objects, with the aid of a leiberkuhn. The average measurement of five of these tubes gave a diameter of $\frac{1}{344}$ th of an inch; the largest being the $\frac{1}{276}$ th, and the smallest the $\frac{1}{484}$ th of an inch.

The cherty nodules from the upper greensand of Shaftsbury presented appearances exceedingly similar to those observed in the specimens from Fovant. The black and semi-transparent mass of chert in the centre was surrounded by a coating nearly an inch in thickness, which had the appearance of agglutinated sand ; and the outer surface of the coat assumed an eccentric tuberosus form, very similar to that of the chalk flints.

Upon microscopically examining the structure of this coat, as an opaque object, numerous contorted canals of various sizes were observed, and beautiful green spicula were visible imbedded in considerable numbers in the mass. It would therefore appear, that the same process went forward during the imbedment of this sponge, which we have supposed to have taken place during the envelopment of the sponge which originated the chalk flints ; but the sponge, in this instance, being of a coarser and more open nature, it has been penetrated by the surrounding fine sandy matter to a greater proportionate depth than in the case of the chalk flints. Two casts of *Spatangus* in chert, from the upper greensand pits at Shaftsbury, presented results analogous to those obtained by the examination of the flint casts from the chalk ; the surfaces

exhibiting numerous tubes and spicula, which corresponded in size and appearance with those shown in the thin sections represented by fig. 1, Pl. XIX. (in Mr. B.'s paper), so that little doubt can exist of the formation of these casts being similar to that of the chalk flints.

Upon examining in the same manner a number of slices from a great variety of masses of chert belonging to the greensand of Lyme Regis, nearly the same appearances were presented as those afforded by the chert of the upper greensand of Fovant. A group of tubuli are represented in Mr. Bowerbank's paper; and their size, mode of disposition, as well as general character, so closely resemble those of the upper greensand, that there is strong reason to believe the sponge to have been of the same species, or very closely allied to it; and it was only when they were examined as transparent objects, with a power of 360 linear, that I could detect any evident difference. Under these circumstances, the tubes of the former present the semblance of a mucous surface, with minute irregular particles of opaque matter adhering to them, while the tubes of the latter exhibit an appearance as if minute patches of a thin epidermal membrane had been partly detached from their surface; but this trifling variation in the appearance of the organic structure may probably have been caused by a slight difference in the circumstances attending their fossilization. The tubuli vary in their size to about the same extent as those of the upper greensand sponge, but their average diameter is as nearly as possible the same.

The dimensions and external form of the masses of chert in the greensand of Lyme are widely different from those of the upper greensand, and would seem to indicate a specific difference, but the resemblance of their internal structure evinces a very close alliance in every other respect. Two specimens of chert from the oolite, one being from the Tisbury limestone, and the other from the Portland, afforded similar strongly-marked evidences of organized structure; but with this difference, that in these there appeared to be a greater quantity of the cellular structure of the sponge preserved than in any of the former instances; and the appearances afforded by the structure, in both cases, were nearer to those of the fresh-water sponge than any of the fossil sponges of the chalk or greensands, with the exception that there were fewer spicula than in the recent fresh-water species. When small portions of dead and decomposing fresh-water sponge were immersed in Canada balsam, and examined microscopically in the same manner as the silicious slices, the appearance was so similar to that of the fossils, as to prove at once that the oolitic cherts derived their origin from decomposed spongy masses.

XXX.—AN ABSTRACT OF THE “INFUSIONSTHIERCHEN” OF
EHRENBERG.—No. 3.*

*By W. Hughes Willshire, M.D., M.B.S., Physician to the
Fore Street Dispensary, &c.*

Genus—MONAS.

EYE, projecting lip, and tail not present; mouth terminal truncated, provided with cilia, or with a flagelliform filament, which is sometimes double, and presented towards the direction in which the animalcule is swimming; dividing by spontaneous self-division bipartitely, or not dividing at all; solitary, not clustering or aggregate.

In general, the species of the genus *Monas* are with difficulty accurately determined; as the young of other genera, of *BACTERIUM*, *VIBRIO*, *UVELLA*, *POLYTOMA*, *PANDORINA*, *GONIUM*, and of many others, for instance, when they have separated from their clusters, or parted with their common envelopes, are very liable to be mistaken for them. A single individual, except observed under the act of self-division, can scarcely ever be specifically, or sometimes even generically determined; and when an observer happens to meet with but very few minute moving points in a fluid he may be examining, he must often rest contented with an *approximation* to the truth. Should the fluid, however, contain great numbers of them, his decision will be easier and more decisive, from the numerous and manifold vital relationships exhibited to them. The following rule, however, may serve to guide the investigator:—Suppose that in a drop of water containing species of the genera *VIBRIO*, *BACTERIUM*, *UVELLA*, or *POLYTOMA*, easily recognisable from their states of aggregation, you observe amongst them solitary Monad-like forms, you may with great probability affirm that the latter are but solitary individuals, or the young of the aggregated ones; and should their size and that of the separate creatures forming such aggregation not be materially different, the conclusion would be generally correct. The same rule equally applies to the green Monad-like forms observed amongst *Pandorina* and *Gonia*. *Chlamidomonas pulvisculus* in the young condition is very deceptive, being very often liable to be mistaken for an eye-less and illoricated green Monad.

* Our limits will not admit of any further analysis of the characteristics and organization of the Infusoria than the present paper exemplifies; which is the more to be regretted, as in the present instance, the strict awardment to Ehrenberg, of the credit for the facts which his industry has accumulated, is especially necessary.

Twenty-five species of the genus *MONAS* are at present known (Ehrenberg enumerates twenty-six, but remarks, that one of them more properly forms another genus); two are of a green colour, two yellowish, two inclining to red, and the remaining eighteen are colourless. Those possessed of colour are most easily recognizable, but it must be remembered, that *colour* is not a sure characteristic.

Genus—UVELLA.

Eye, projecting lip, and tail not present; mouth terminal truncated, provided with cilia, or a flagelliform and delicate proboscis (double?), in the solitary individuals presented towards the direction in which they are swimming; dividing by spontaneous self-division bipartitely, or not dividing at all, and aggregating *voluntarily*, at certain periods, into grape or mulberry-like clusters, which, when in motion, *roll*. The solitary animals do not *roll*, but progress in the direction of the longitudinal axis of their body. Six species are known: two are of a green colour, the remainder are colourless.

Genus—POLYTOMA.

Eye, projecting lip, and tail not present; mouth terminal truncated, provided with cilia, or a double flagelliform proboscis, in the solitary individuals presented towards the direction in which they are swimming; spontaneous self-division for some time decussating multipartite and imperfect, giving rise to a mulberry-like appearance of the body; afterwards perfect, and forming separate animalcules.

This genus is mainly characterised from *Uvella*, by the temporally incomplete condition of division, the species of the latter dividing completely and very soon, or else not at all. The solitary creatures in *Uvella* cluster voluntarily together, and roll along in a berry-like form; each separate animalcule rolls in unison with its clustering neighbours. In *Polytoma* a general motion is impressed upon the whole mass together. The former resemble flocks of birds and herds of animals; the latter moving coralline clusters. One species is known, this is colourless.

Genus—MICROGLENA.

Projecting lip, and tail not present; eye present; mouth terminal truncated, provided with a simple delicate flagelliform proboscis, presented towards the direction in which the creature is swimming; spontaneous self-division simple, perfect, and bipartite, or none.

This genus is characterised by the presence of a red point at the an-

terior portion of the body, and which is here regarded as a visual organ ; in other respects it possesses the characters of the true Monads. Two species are known ; one is of a yellow, the other of a green colour. (I may remark, that Ehrenberg, in his *tabular* analysis of the family Monadina, allots either one or two proboscides to MICROGLENA, whilst here he affirms it is simple.)

Genus—PHACELOMONAS.

Projecting lip, and tail not present ; eye present ; mouth terminal truncated, provided with numerous (8—10) cilia or filiform proboscides, presented towards the direction in which the creature is swimming ; spontaneous self-division simple, perfect, and bipartite, or none.

The more essential character of the genus is the presence of numerous delicate proboscides, placed around the oral aperture, and which form a cilia-wreath.

One species is determined, and is of a green colour.

Genus—GLENOMORUM.

Projecting lip, and tail not present ; eye present ; mouth terminal truncated, provided with a double filiform proboscis, which, in the solitary animalcules, is presented towards the direction in which they are swimming ; dividing by spontaneous self-division bipartitely, or not dividing at all ; clustering or becoming aggregate at certain periods, assuming the form of a mulberry or a bunch of grapes.

The genus comprehends but one species (first described as *Monas tingens*) ; it is very nearly related to the genus CHLOROGONIUM, of the family ASTASIEA, and through this to AMOEBAE ; the species is of a green colour.

Extracts and Abstracts from Foreign Journals.

[From Müller's *Archives*, 1841.*]

On the Rotary Movements of the Yolk in the Ovum of Mammalia, during its passage through the Fallopian Tube. By Professor J. L. W. Bischoff, of Heidelberg.—The attention of Professor Bischoff was called to this phenomenon by an observation of Dr. Martin Barry, in the Philosophical Transactions for 1839. Dr. Barry there mentions having on one occasion met with an elliptical vesicle (filled with a transparent

* The two following articles are extracted from the London and Edinburgh Monthly Journal of Medical Science. October 1841.

fluid in which were small elliptical granules), adherent to the mucous membrane of the Fallopian tube. In the centre of this vesicle was a mulberry-like body which continued rotating on itself for half an hour, the rotation subsiding by degrees into a tremulous motion. Professor Bischoff was of opinion, that this vesicle was an ovum, and the rotating body its yolk, and he adduces an observation in corroboration of this supposition.

Having carefully laid open, with a pair of fine scissors, the Fallopian tubes of a rabbit, which had been placed with a male during the previous eight days, he found four ova close together, about the middle of the tube of the left side. Within the zona pellucida of these ova was the yolk which, however, did not completely occupy its area, but between the yolk and the inner surface of the zona a transparent fluid intervened. In this fluid each yoke-ball continually rotated on its own axis, in the direction from the uterus to the ovary. On examining the ova with a power of 800 diameters, the surface of the yolk was seen to be furnished with very minute ciliæ, by the vibration of which this movement was effected. Professor Bischoff convinced himself, by very careful examination, that the ova themselves remained perfectly still during the continuance of this rotatory motion of the yolk, which ceased on the preparation being moistened, in order to prevent the ova from drying up.

In this phenomenon Professor Bischoff sees a fresh point of coincidence between the processes of development in mammalia and in other animals, since similar rotatory movements of the yolk have been observed in the ova of mollusca and polyps, and recently by Von Siebold and Ehrenberg in those of medusa aurita.—*Heft. 1.*

On the Formation of Contagious Confervæ (?) on Living Frogs. By Dr. Stilling, of Cassel.—The facts stated in the paper of Dr. Stilling are derived from observations on several hundred frogs, made in 1839 and 1840, while the author was investigating the influence of the nerves on the circulation of the blood.

In the course of his experiments, Dr. Stilling frequently removed the greater part of the under half of the spinal cord, closing the wound afterwards with sutures. Frogs thus treated, continued to live for months, if placed in flat vessels, sufficiently shallow to enable them to breathe, by raising themselves on the fore-legs, and thus bringing their mouths above water. At an indefinite time after the operation, however, the tips of their toes frequently put on a whitish appearance, as though they had been dipped in hot water. This condition always shewed itself first on the toes of the hind feet. The extent of surface thus affected was sometimes extremely small, but in other instances the last joint of the toes, or the last two joints, were involved. The epidermis in these situations appeared to be much thickened, of a whitish grey colour, and could easily be wiped off, when it left the true skin denuded, but perfectly smooth. On the following day the diseased epidermis would be reproduced; and it might for several days be thus renewed at pleasure. If left to itself, however, very fine filaments, in close apposition with each other, resembling mould, sprout up with such

rapidity, that, when the weather is warm, an efflorescence several lines in length covers the affected parts of the living animals in the course of two days. After the animals had died, provided their bodies were kept in water, the efflorescence grew to an inch and a half in length in four or five days.

If the efflorescence was allowed to remain on the toes, for two days or more, without being wiped off, it became much less easy to remove it, and after it was detached, the subjacent skin was seen to be excoriated, reddened, and ulcerated. From the first appearance of this affection, the health of the frogs was always sensibly impaired, but nature in every case attempted a cure. This consisted in an exfoliation of the skin, which took place very rapidly, though it was seldom complete, since the paralysed and sickly animals were unable to free themselves from the epidermis. If the efflorescence was left untouched, it extended very quickly on the toes, and likewise appeared on various other parts, as the fore-feet, the fore-arms, thighs, and edges of the mouth, in which last situation it always proved fatal. Nearly the whole surface of the body would thus become covered by this growth, which continued to increase for four or five days after the death of the animal, but afterwards it changed its appearance, and became converted into a slimy mass of a whitish yellow colour. In most instances, this efflorescence appeared between the fourth and sixth day after the injury to the cord, sometimes on the second day; in a few instances, not until the fifth, sixth, or twelfth week. A careful removal of the morbid epidermis, and washing the part daily with water, prevented the extension of the disease, and sometimes effected its cure, but it always had a great tendency to return, and occasionally reappeared after an interval of three months.

When examined under the microscope, this efflorescence was seen to be made up principally of long tubes, seldom ramified, but frequently dichotomous, and filled more or less completely with black granules. Their breadth was usually 0.00065 of a Paris inch. They varied in length, usually terminating in a cone, though occasionally they had a club-shaped extremity. The granules were 0.0001 of an inch in diameter, transparent in the centre, with a black well-defined edge. Dr. Stilling was much surprised at observing an independent motion in these black granules, and was for some time at a loss to account for the occurrence. These movements occurred among the granules contained in the tubes, the whole of the contents of which were sometimes in independent motion; sometimes only a small part of their contents moved, while the remainder were motionless. Similar movements were observed in some of the granules which had escaped from the tubes. By a careful examination of these latter, Dr. S. satisfied himself that they were ova, from which very small acicular Infusoria issued. The movements of these granules are supposed by him to be owing to the efforts which the animals make to escape from the ova, since they were frequently seen moving about with the granules attached to their head. In the course of a day or two these animals became much less numerous, and their place was supplied by others, which, instead of a simple vibratory motion, executed very rapid serpentine movements.

The disease was capable of being propagated by inoculation to salamanders, lizards, and unhealthy frogs; but frogs in health did not appear to be affected by it.

The real nature of the tubes, in which the granular contents were observed, still remained unsettled. But, after ascertaining that these contents were precisely similar to the matter produced by the decomposition of dead frogs, and that they consisted of the ova of Infusoria, it became evident that, notwithstanding their apparent resemblance to Confervæ, the notion of their vegetable nature was untenable. Most probably the tubes are an albuminous or fibrous structure, which forms a sort of nidus, in which the numerous ova become developed. The cellular structure which has been perceived in them does not militate against this supposition; for the imaginary cells are verticillæ, which Dr. Stilling has frequently seen burst, and discharge their contents.

Dr. Stilling concludes, that,—as in the case of frogs whose spinal cord has been injured,—the serious local disturbance of the vegetative processes of any part, especially where a state of previous debility existed, induces the excretion of a peculiar organic substance (albumen or fibrin), which is favourable to the development of the ova Infusoria. He dissents, therefore, from Hanover's opinion of the vegetable nature of this efflorescence, which either is essentially different from the muscardine, or, which perhaps is more probable, the vegetable nature of the muscardine is merely apparent, and further investigations will prove it to be of animal origin, the result of the development of Infusoria.—*Heft.* 3 & 4.

[From the *Annales des Sciences Naturelles*, April 1841].

Duvernoy and Lereboullet on the Respiratory Organs of Crustaceous Isopoda, (concluded.)—The conclusions which these authors have arrived at, relative to their natural history, systematically or classically considered, are :—1. That the abdominal position of the organs of respiration, or the suspension of these organs as appendages to the rings of the abdomen, is the only common character which exists in all the families of this order, such as are limited to the classification which we have followed. 2. That in attending to the characters afforded by the position, form, and structure of the branchial apparatus, the first six families may be grouped together, under the name of *Normal Isopoda*. They approach each other by the relation of their organs of respiration, by the sub-abdominal position of branchial organs, and by their general structure; this apparatus being formed of branchial vesicular plates, covered over by protecting lamellæ or opercula.

The second group, that of the last three families of *Bopyridæ*, *Keponidæ*, and *Ionidæ*, form the *Abnormal Isopoda*. They are devoid of opercular plates, properly speaking, to protect the branchial organs. The *Bopyridæ* is the only one which has them entire and beneath the abdomen. The *Ionidæ* have them of an arborescent form, floating around the abdomen; a double character, altogether abnormal among the Isopoda. The *Keponidæ* have them intermediately between these two fa-

milies ; in part sub-abdominal and entire, or nearly so, in part floating around the abdomen, and fringed. But, in this last family, the sixth pair of floating abdominal appendages, is likewise converted into branchia ; this does not take place in any other of the Isopoda. 3. It may also be concluded from the facts detailed, that the situation, structure, and general form of the respiratory apparatus in the *Crustaceous Isopoda*, is the same in each family. 4. That certain genera exhibit in their respiratory organs peculiarities of structure common to the best characters which can at present be made. Such is the genus *Porcellio*, which cannot henceforth be distinguished from *Oniscus*, except by the absence of an articulation in the external antennæ, but still more by the presence of a white body in the first pairs, at least, of the opercular lamellæ of its respiratory apparatus. 5. Lastly, a single genus, viz. *Tylos*, composed of only one species, is distinguished by the singular modifications in the structure of its respiratory system, of which the knowledge already detailed by M. Milne Edwards, leads us to think it ought to form the type of a distinct family.

A plate, containing seventeen figures, illustrates in detail the researches of these authors.

Flourens's new researches on the Action of Madder on Bones.—In a previous memoir, the author gave the results of his researches on the action of madder to enable the observer to follow the development of bones in thickness. This Duhamel and Hunter have done before him, but not to so great an extent. Neither of these philosophers have thought of profiting by the action of madder in separating and following the gradual development of bones in length. We have alluded to it here, in consequence of its physiological interest ; the paper is worthy of attentive perusal.

Rusconi's observations on injecting the Lymphatic Vessels of the Salamander and Frog.—The previous part of this communication is not microscopic. "If," says M. Rusconi to M. Breschet, "you are desirous of pursuing researches on the lymphatic vessels of *small animals*, I would suggest the impropriety of making use of the injecting tubes of Sœmmering, and also of not using mercury, because that metal, by its weight, easily ruptures the tissues of small animals, finds its way out of the vessels, extravasates, after having dilated beyond their usual size, the canals in which it was in the first instance introduced ; in a word, it alters everything. Instead of mercury, make use of coloured wax, red or blue, and mix with it nut-oil, in greater or less quantity, according to the temperature of the season, and perform your injection with a small syringe. I can assure you, after much experience, that you will be satisfied."

Rusconi's method of dissecting small Embryos.—In the same paper, he continues, "At the last meeting of Naturalists which took place at Turin, I read a short paper on the method I adopt to dissect very small embryos. It consists of imbedding them in wax, in a manner similar to the diamond, previous to its being polished by the lapidary, then dissecting the embryos beneath water, after having lightly washed them with an acid solution, composed of one part nitric acid,

and eight parts of water. It is with the assistance of this anatomical process that I have followed the development of the brain of the frog, and I much regret that Professor Serres was not acquainted with it at the time when he made his observations on the brain in the four classes of vertebrated animals. If he had known of it, he would not, as he himself says, have had so many obstacles to conquer, to follow the formation and successive changes of the brain and spinal cord of the Tadpole."

Van der Hoeven on the Blood Globules of Cryptobranchus Japonicus.—On subjecting the blood of this animal to examination under a simple microscope and lens of medium power, he perfectly recognised the oval globules with their nuclei. With the assistance of Plessl's microscope, he ascertained that the globules measured $\frac{1}{19}$ of a millimetre, or $\frac{1}{42}$ of a line in length, by $\frac{1}{30}$ — $\frac{1}{32}$ of a millimetre, or $\frac{1}{63}$ of a line in breadth. With a power magnifying about eight times, the globules might be distinguished; and one of twenty-seven times was sufficient to discover the nucleus with clearness. The *Cryptobranchus Japonicus* is then, after the *Proteus*, a second example of a vertebrated animal with very large corpuscles or blood-globules.

V. Audouin's remarks on the Phosphorescence of some Articulated Animals, occupies the three remaining pages of the Zoological part of the April number.

September 22d, 1841.—*R. Owen, Esq., F.R.S., President, in the Chair.*

THE Secretary, Mr. J. Quekett, made some observations on four species of Epizoa, which he had obtained from a common water-rat. He stated, that the vermin which infested the bodies of most, if not of all, animals, are principally referred to the order of insects termed Parasita by Latreille, but Anopleura by others, and are characterised by having six legs, no wings, and their sense of sight consisting of four or two small ocelli; their mouth is internal, and exhibits on the outside a snout enclosing a retractile sucker, or two membranous lips, with two hooked mandibles. Of the four species only one came under the order Parasita, the other three having each eight legs, and appeared to belong to the genus Acarus. One of them was very small, with a slender body, marked with transverse rugæ, and a head of a brown colour; the eggs of this species were found in abundance on the hairs. A second species was provided with curious hook-like appendages at the end of each leg, its body was of a globular figure, and its colour light yellow. The third species was of a pinkish hue, and only seven of them were found, and these in the ear of the animal; whilst the last was the largest of the whole, and of a brown colour: it had six legs and a pair of antennæ, and differed very little in shape from the Pediculus of the human subject; it was the most abundant of the four, and the only one that belonged to the order Parasita.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

September 2nd, 1841.—T. F. Bergin, Esq., in the Chair.

THE minutes of the last meeting having been read,

Mr. Yeates exhibited several specimens of Daguerreotyped microscopic objects, prepared according to a modified process recently adopted in Paris.

Mr. Ball exhibited a fragment of a Spongiform silicious body, given him by Mr. Stutchbury of Bristol, for examination. In the interstices of this substance are numerous regular forms, which Mr. S. seems to consider as granules of sponge; they appear to consist of cylindrical tubes, radiating in every direction from a common centre. They are objects of much beauty and interest, somewhat resembling *Xanthidia*.

Microscopical Memoranda.

Note on Preserving Valisneria.—It is very generally known to those observers who keep *Valisneria* for microscopic purposes, that in the course of a short time the whole plant becomes covered with a very delicate *Conferva*, or some nearly allied genus; to remove which, it has been recommended to place a few fresh-water snails, such as the species of *Limneus*, *Planorbis*, *Physa*, &c., to be met with in plenty in almost every stagnant pool or ditch. We are informed by Mr. George Busk, that Gold and Silver Fish placed in the water with the *Valisneria*, is an effectual means of keeping under the growth of the *Conferva*, besides having a more elegant appearance than Pond Snails.—*Editor*.

On an improvement in the Polarizing Microscope.—Sir D. Brewster's improvement consists in placing the analysing prism, or simple rhomb, immediately behind the object-glass; that is, on the side of the object-glass next the eye. The great inconvenience of placing it between the eye-glass and the eye, has induced several skilful observers to reject the prism altogether as an analyser, or to substitute for it a plate of tourmaline, which is quite unfit for any observations in which colour is to be considered. The analysing prism may remain constantly on the microscope behind the object glass, without in the least injuring the performance of the microscope; and it should have a motion of rotation independent of the body of the microscope.—*Rep. Brit. Assoc.* 1840.

[This supposed improvement has for many years been adopted by Mr. J. T. Cooper.—*Editor*.]

Organic nature of Glairine.—Dr. Daubeny, at the late meeting of the British Association, stated, that D'Anglada, an Italian chemist, had spent much time in the investigation of Glairine, and believed it to be the produce of chemical action in the waters. He had long since come to the conclusion, that glairine was an organic product; and in his Report on mineral and thermal waters, presented to the Association at Bristol, had stated this as his opinion.—*Athenæum Aug.* 7, 1841.

XXXI.—OBSERVATIONS ON PARASITICAL GROWTHS ON LIVING ANIMALS.

By George Busk, Esq., Surgeon to the Hospital Ship, Dreadnought, &c.

THE occurrence of parasitical growths, or of organized productions, having a close analogy with some forms of cryptogamic vegetation, upon the surfaces or within the substance of living animals, and in many instances constituting the cause of disease, is a subject of considerable importance in pathology; and although it would be out of place in these pages to enter into the pathological relations of these affections, yet as the microscope has been the means by which the few facts as yet ascertained in this matter have been brought to light, it may not, perhaps, be deemed irrelevant to the object of the MICROSCOPIC JOURNAL, to admit a short statement of what has been observed, and thus to bring into one point of view, and attract the attention of microscopists, to a probably not unfertile field of investigation.

1. On the 28th of August, 1832, Mr. Owen read some notes before the Zoological Society on the anatomy of the Flamingo, (*Phanicopterus ruber*), in the lungs of which bird he found numerous tubercles and vomicæ, the inner surface of which latter was covered with a greenish vegetable mould or *mucor*. Mr. Owen presumed that the growths had taken place during the life of the animal, and thence concluded that internal parasites are not derived exclusively from the animal kingdom, but that there are *Entophyta* as well as *Entozoa*.*

2. In the year 1835 a disease to which silkworms are subject, known under the name of *Muscardine*, was first described by M. Bassi of Lodi, and M. Balsamo, a botanist of Milan. They ascertained that this disease was owing to the growth, on or within the body of the caterpillar, of a cryptogamic vegetation. M. Audouin, in 1836 and 1837, in a paper entitled "Anatomical and Physiological Researches on the contagious disease which attacks silk-worms, and which is designated under the name of *Muscardine*,"† described a series of experiments on the chrysalis of *Bombyx Mori* thus affected, and which he had received from M. Bassi. He was able to follow in detail the transformation of the

* Philosophical Magazine, 1833. New Series, Vol. II, Page 71.

† Annales des Sciences Naturelles, Vol. VIII, New Series, Page 229, Pl. 10, 11.

fatty tissue of the insect into radicles (thallus) of the cryptogamic vegetation, to which he gave the name of *Botrytis Bassiana*.* (Pl. 1. fig. 4.)

3. The next observation is that of M. Des Longchamps,† in a paper "On the habits of the Eider duck (*Anas mollissima*)", in which he describes the occurrence of layers of *mouldiness* developed during life, on the internal surface of the aerial cavities of one of these birds, which he examined on the 2nd July, 1840, while yet warm. This vegetation occurred in the form of flakes or layers, deposited in great numbers on the walls of these cavities. Most of these plates, or layers, were circular, and they varied in size from two or three millimetres to several centimetres. The small bronchial tubes were covered with them in great abundance. Two kinds of these plates or flakes were observed. Beneath the larger ones the membrane upon which they were situated was uniformly reddened and thickened; beneath the smaller ones, towards the centre, a vascular net work was seen, surrounded by a zone, in which the vascularity was less distinct, and beyond this zone the vascularity was again increased, but in less degree than in the centre. The colour of the smaller flakes was a dirty white; the larger ones were also white, but greenish in the centre. The border of the larger flakes was irregular, which irregularity evidently resulted from their being formed by the confluence of several adjoining smaller flakes. Examined under the microscope, this mouldiness appeared to be composed of transparent non-articulated filaments (Plate 1, fig. 3), slightly, if at all branched, and intermixed like the fibres of felt. These filaments, imbedded in a layer of albumen, were in parts scarcely the $\frac{1}{200}$ th of a millimetre in diameter. M. D. further observed numerous ovoid or globular vesicles in the felt-like mass, of the same diameter as the filaments, which vesicles he looked upon as sporules. These growths appeared to have no immediate connexion with the living tissue.

4. A mouldiness of a different kind was also observed by MM. Rousseau and Serrurier‡, which they describe as being found not unfrequently in pigeons and fowls, particularly in cold and humid situations, or in rainy seasons. These observers found it in the body of a male

* For further observations on this disease, vide a paper by M. Johanny, *Annales des Sciences Naturelles*, Vol. XI, Page 65, 80; and one by M. Crivelli, in *Schlechtendahl's Linnæa*, 118, 123; and by M. Bonafous, *L'Institut*, No. CCLXXIX, Page 154; and Henle's *Pathologisch. Untersuchung*.

† *Annales des Sciences Naturelles*, June 1841, Page 371.

‡ *Comptes Rendus*, 1841.

parroquet, which died of a tubercular disease, in a sort of false membrane between the intestines and vertebral column, which membrane was covered with a greenish pulverulent mouldiness, so light, and so little adherent, that it could be blown off as a fine powder. They further state, that a similar affection has been noticed by them in animals of other classes, as in *Cervus Axis*, and *Testudo Indica*.

5. In 1839, M. Schœnlein* announced the fact of the existence of *Mycodermata* in the crusts of *Tinea favosa*. Priority, however, in this observation, is claimed by M. Remak,† who says that he made it as far back as 1836, when he stated that *Tinea favosa* consisted of fungoid filaments.‡

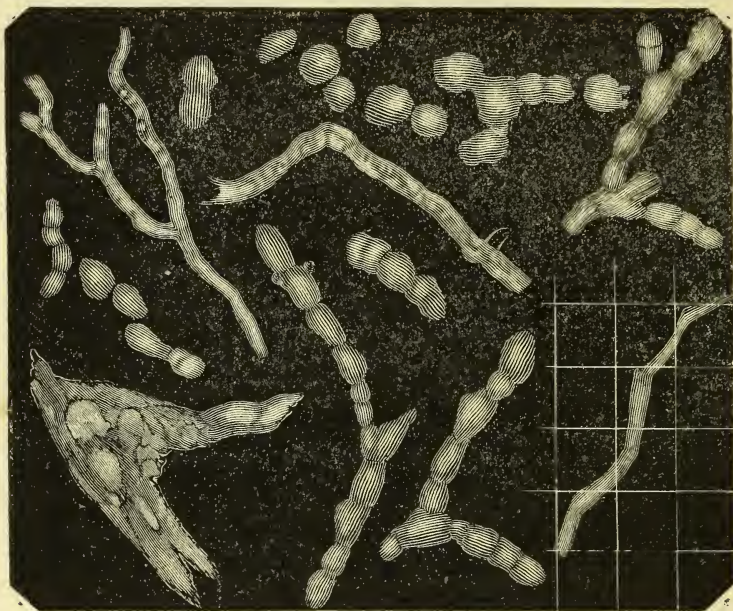
On the announcement of Schœnlein's experiments in 1839, they were repeated by MM. Fuchs and Langenbeck, at Göttingen, who supposed that they proved the existence of *mucores*, not only in the crusts of true *Tinea* (*Porrigio favosa* and *P. lupinosa*), but also in the majority of eruptions belonging to what they term cutaneous scrofula, for instance, in the crusts of *Impetigo scrofulosa*, and in those of serpiginous ulcers. These researches are published by M. Fuchs, in his *Compte Rendu* the Polyclinique of Göttingen, in the *Ann. Hanov. de M. Holscher*, Cahier de 1840, and still later in the first volume of his *Traité des maladies de la peau*, Göttingen, 1840.

Latterly, however, a much fuller and more correct description of this disease has been given by M. Gruby, of Vienna,§ who states that the crusts of *Tinea favosa* contain, or in fact are made up of aggregated *Mycodermata*. This growth consists of numerous corpuscles, rounded or oblong, the longitudinal diameter of which is from about the $\frac{3}{100}$ th to the $\frac{1}{100}$ th of a millim, and the transverse from the $\frac{3}{100}$ th to the $\frac{1}{150}$ th. They are transparent, with a defined border, and smooth surface; colourless, or slightly yellow, and homogeneous. The corpuscles are either separate, or, by their apposition end to end, constitute beaded or articulated filaments, which are simply cylindrical or branched, according to the part of the crust in which they are found. Besides these beaded filaments, other much smaller branched filaments are to be observed, which are furnished at certain distances with partitions (cloisons vegetales), and thus represent oblong cells, in which are found very minute round, transparent molecules, as exhibited by the figures in the accompanying plate. Occasionally, some granules are found ad-

* Müller's Archives. † Medicinisch. Zeitung, No. XVI, Page 73, 74.

‡ Valentin's Repertorium, 1841. § Comptes Rendus, 1841.

herent to these filaments, similar to the spores of *Torula olivacea*, and *T. sacchari*.* The form of these filaments, is considered by M.



Portion of Epidermis.

Scale $\frac{1}{8000}$ of an inch each.

Gruby a sufficient proof of their vegetable character, and according to M. Brogniart they belong to the group of *Mycodermata*.

Each crust of *Tinea* is described by M. Gruby to consist of two envelopes, formed by the cuticle, and an aggregation of *Mycodermata*, which are enclosed within them *like fruit in their pericarps*. The crusts are placed on the *surface* of the true skin, and the *Mycodermata* are developed among the cells of the epidermis.

The external disc of the capsule, which at the commencement is not perforated, becomes open in the centre by a small hole, whose borders are elevated, by the continual development of the *Mycodermata*. This opening enlarges by degrees, and there is thus formed in the centre a

* *Icones fungorum hucusque cognitorum*. A. C. J. Corda, Pragæ, 1837, 1840.

[The above figures, copied from the drawings of Mr. G. Busk, are engraved on copper, by Mr. J. Shury, Jun., of 13, Charterhouse Street. We were desirous of giving the process a trial, as it appeared to us peculiarly applicable to the illustration of such structural subjects. Here is the result; we leave our readers to form their own opinions as to its merits or demerits.—*Editor*.]

whitish excavation, whilst the borders remain of a yellowish colour. Simultaneously with the enlargement of the opening, the Mycodermata protrude, and are developed like a fungus, and finally the borders disappear; the stems of the Mycodermata are prolonged, and the sporules shoot out vigorously, more in the centre than at the periphery. From this mode of growth, the form of the crust becomes quite altered, it being, when completely developed, convex, instead of concave on the outer surface.

M. Gruby practised inoculation with the contents of these crusts upon thirty Phanerogamous plants (but succeeded only once); on twenty-four silk-worms; four birds; eight mammals; and six reptiles, without any result. Similar inoculation in the arm of himself four times, and of another individual once, was followed also by no result, except in one instance, when a little inflammation ensued. Consequently, out of seventy-seven inoculations, one successful result only was obtained, and that on a Phanerogamous plant; a strange fact, as is truly observed by M. Gruby.

At pages 24 and 139 of this Journal will be found notices of various other observations of parasitical growths on animal bodies; but these my limits will not allow me farther to detail. In the present number, (p. 155) also, is an account of similar vegetation on the ova of fishes, to which it proves highly destructive.

On the 1st of March 1841, Mr. Westwood exhibited at the Entomological Society, dried specimens of Chinese larvæ, from the back of the neck of each of which a slender Fungus, twice as large as the body of the insect, had been produced. The vegetation was stated to be analogous to some on larvæ from New Zealand, and is named *Clavaria Entomorrhiza*.* M. Corda gives the figure of a Coleopterous insect† covered with *Penicillium Fieberi*; and a similar instance of the growth of a minute Conferva upon the body of a *Dytiscus marginalis*, occurred a short time since to my observation. This insect was kept in a glass vessel, in which were growing some plants of *Valisneria spiralis*, the leaves of which were much infested with the Conferva. The beetle was killed, apparently by the growth of the Conferva among the branched hairs, with which its spiracula are furnished internally. ‡ (Pl. I. Fig. 1.)

* Annals of Natural History for November 1841.

† *Pentatoma prasina*, Op. cit. Pl. xi.

‡ [We are informed by Mr. J. T. Cooper, that he has frequently removed from the gills of gold fish, kept in a cistern in his garden, a quantity of Confervæ, the rapid growth of which over the whole surface of their bodies, in every instance caused death.—*Editor*.]

These are the principal facts which I have been able to collect on this subject ; for it is scarcely worth while to refer to the vague speculations of M. Meynier of Orleans, whose assertion of the analogy of warts and similar growths, with Fungi of the order Gymnospermia ; of Lepra and Psoriasis with Lichens and Mosses ; and of pulmonary tubercle with Lycoperdon, may, I think, justly be considered more the fruit of a heated imagination than of sure observation. The *Mucres* observed by Langenbeck in the body of a person dead of typhus, had certainly no connection with that disease ; and, as for the opinion, that hospital gangrene is dependent on the presence of a fungoid growth, I am unable to refer to the authority, upon which such a doubtful statement is founded.

The above briefly recited facts are far too few in number, and not sufficiently precise, to allow of any general deductions of importance to be drawn from them ; but it appears clear,

1.—That parasitical growths occur in nearly all classes of the animal kingdom.

2. That these growths arise usually on the surfaces of animal organs, and are sometimes prolonged thence into the textures of the part.

3. That they have in several instances been ascertained to constitute the cause of disease and death ; and that the disease thus produced has been found in some cases to be contagious.

4. That they are probably of two kinds, the one peculiar to animal bodies, and the other consisting of these Cryptogamic vegetations, which readily sprout up under favourable circumstances, on almost any inanimate substance.

To the former kind may be referred the *Muscardine* of the silk-worm and *Mycoderm* of Tinea ; and to the latter, most of the other growths above alluded to.*

The vegetable nature of these growths does not in all cases appear so clear as might be supposed. In some of the instances cited above, there can be no doubt on the matter ; but in others, and especially that of the *Mycoderm*, constituting the crusts of Tinea, it is allowable to doubt whether the growth may not be more properly referred to the animal kingdom. In fact, it would appear, from the chemical consti-

* With the exception of the Parroquet, whose case is related by M. Rousseau and M. Serrurier, in which, in the account given by these observers, the seat of the parasitic growth is by no means clearly defined, it would appear that these parasitic growths have nearly all had some relation to the air passages, and in this point of view it is interesting to refer to the account of *Chrysomyza Abietis*, at p. 155 of this Journal.

tments of these crusts, impossible to hesitate in ascribing their contents to that division of animated nature; for according to the analysis of Thenard, they contain

- 70 Albumen.
- 17 Gelatine.
- 5 Phosphate of lime.
- 8 Water and loss.

100

a composition certainly more animal than vegetable. With regard to this, also, it is interesting to refer to the paper of M. J. B. Desmazieres,* in which the genus *Mycoderma*, founded by Persoon in 1822, is for the first time accurately described and figured. He describes five species occurring in various vegetable infusions. The marked similarity of the figures of some of these species, with the Mycoderm of Tinea, is sufficiently curious, viz. those of *M. glutinis farinulæ* and *M. cerevisiæ*, or those occurring in flour-paste or sour beer (Pl. I, fig. 2). M. D., whose paper is well worthy of perusal, considers, from his having observed the globules of the Mycodermata occasionally in active motion, that they are of animal nature, and gives the following definition of the *genus*: —MYCODERMA.—*Desmaz. Ann. Sc. Nat. Tom. X. 1e Ser. p. 59.*—"Animalcula monadina simplicissima, hyalina, gelatinosa, minutissima, prædita locomobilitate plusminusve manifestâ; inter se ab uno extremo ad alterius extremum ordine longo coherentia, sive in statu primordiali, sive post elongationem plus minusve notabilem; efformantia hæc adjunctione fila inertia, hyalina, creberrima, ramosa, moniliformia, vel dissepimentis conspicua, fere semper incumbentia liquoribus, vel substantiis humidis in quibus nascuntur et ubi, per eorum implicationem, constituunt pelliculam plus minusve spissam. Generatio per gemmas interiores."

The resemblance in figure, however, of this parasite to various growths, in all probability vegetable, is equally striking, if we do not consider that all growths composed of distinct rounded cells, whether of animal or vegetable nature, will necessarily much resemble each other. For instances of this resemblance, it is only necessary to refer generally to the plates in M. Corda's work,† and particularly to the figures of *Gonatorrhodon speciosa*; the extreme filaments of *Stysanus*

* "Recherches Microscopiques et Physiologiques sur le genus *Mycoderme*."—*Annales des Sciences Naturelles*, Tom. X. 1^e. Ser. 1826.

† *Pracht-Flora Europæischer Schimmelbildungen*, Leipzig, 1839.

Caput Medusæ ; *Torula Tritici* ; *Torula olivacea* ; *Torula frutigena* ; and several others.

The description of the Mycoderm of *Tinea*, by M. Gruby, above referred to, so accurately corresponds with the observations I have myself been enabled to make very lately, that I have thought the addition of a few figures of the appearance presented by this parasitic growth under the microscope (see Figures, p. 148), would be sufficient to prove the truth of the position, that the disease does in reality consist of such a growth, and that this growth corresponds in every respect with the characters of Persoon's genus, *Mycoderma*. I have not, however, been able to perceive any movement in the globules themselves, as appears by M. Desmazieres' observations, to have been the case in other species of this genus. There is, however, always to be observed in the fluid with which the Mycodermata may be mixed, a great number of actively moving molecules or minute Infusoria.

This Mycoderm is readily seen by placing a fragment of a crust of *Porrigo*, moistened with water, between two glasses. The younger crusts present many of the small branched filaments and separate corpuscles; the larger crusts contain more of the beaded filaments, and in all, *the Mycodermata are found mixed with epidermis scales.*

XXXII.—AN ABSTRACT OF THE “INFUSIONSTHIERCHEN” OF
EHRENBURG.—No. 4.

*By W. Hughes Willshire, M.D., M.B.S., Physician to the
Fore Street Dispensary, &c.*

Genus—DOXOCOCCUS.

EYE, projecting lip, and tail not present; position of oral aperture varying with respect to the direction towards which the animalcule is swimming; motion *rolling*, similar to the clusters of *UVELLA*; spontaneous self-division simple, perfect, or none. In other respects they resemble the *Monades*.

Four species are known: one is of a brick-red colour, another of an obscure green, a third whitish with green spots, and the fourth is colourless.

Genus—CHILOMONAS.

Eye and tail not present; projecting lip present; mouth lateral or oblique, provided with cilia (?) or with a very delicate filiform proboscis (double ?); spontaneous self-division perfect, or none.

The members of this genus are well characterised by the oblique position of the oral aperture with respect to the longitudinal axis of the body, and by the presence of the protuberant lip. The creatures move in the direction of the longitudinal axis of the body.

Three species are known : two are devoid of colour, and the remaining one is of a pale yellow hue.

Genus—*Bodo*.

Eye and projecting lip not present ; tail present ; mouth terminal ; spontaneous self-division simple, perfect, and bipartite, or none.

The presence of a caudal appendage sufficiently characterises the species of the present *genus*. It may be remarked, however, that the solitary individuals sometimes cluster voluntarily, forming mulberry or grape-like masses.

Eight species are known : one is of a green colour, the rest are colourless.

Bodo socialis is one of the Infusoria most frequently met with in stagnant spring water, and vegetable infusions. Three other species are parasites.



FAMILY II.—*CRYPTOMONADINA*.

Polygastric animalcules provided with a hard or soft lorica, and in other respects possessing all the characters of *MONADINA*, or, at least, not possessing any of the characters of other tribes of Infusoria : spontaneous self-division simple, perfect, or none.

All self-moving, free, and minute microscopic organisms, possessing the characters of the tribe *MONADINA*, or not presenting those of any other family, and not enclosed in a general or common envelope, but in consequence of their self-division being perfect, or absent altogether, are free and solitary, and separately enclosed in a special gelatinous, membranous, or hardened lorica, belong to the family *CRYPTOMONADINA*.



Proterocentrum.

The following is a Synoptical Table of the Genera :—

Organ of sight not present	Lorica obtuse and smooth	Form short ; self-division longitudinal or wanting	{ CRYPTOMONAS.
		Form elongated, tortuous ; self-division transverse	{ OPHIDOMONAS.
	Lorica acuminated anteriorly..... PROROCENTRUM.		
Organ of sight present	Lorica, with a neck or narrowed orifice LAGENELLA.		
	Lorica with- out a neck or narrowed orifice	Lorica an open shield, or <i>scutellate</i> ...	CRYPTOGLENA.
		Lorica a closed case, or <i>urceolate</i>	TRACHELOMONAS.

Genus—CRYPTOMONAS.

Eye not present ; anterior extremity obtuse ; form short, not filiform or elongated ; spontaneous self-division longitudinal, or none.

The species of this genus are like those of CHILOMONAS ; but the latter are destitute of a lorica.

Seven species are known : five are of a green colour, the remaining one is brown.

Genus—OPHIDOMONAS.

Eye not present ; lorica obtuse glabrous ; form elongated, or filiform ; spontaneous self-division transverse.

One species is alone described : this is of a brown colour.

Genus—PROROCENTRUM.

Eye not present ; lorica glabrous, terminating anteriorly in a point.

One species is known : this is of a yellow, waxy hue, and is one of the phosphorescent Infusoria met with in luminous sea-water.

Genus—LAGENELLA.

Eye present ; lorica rostrate, or with a neck, or narrowed orifice.

One species is known : this is of a beautiful green colour.

Genus—CRYPTOGLENA.

Eye present ; lorica open like a buckler, and rolled in at the edges (*scutellate*) ; not rostrate or necked.

Three species are known : these are of a green colour. One is found in water when of a temperature near the freezing point.

Genus—TRACHELOMONAS.

Eye present ; lorica a closed case, or urceolate, not rostrate, or provided with a neck.

Three species are known : two are of a green, one of a dark brown colour.

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

Unger on Chrysomyza Abietis.—Under the name of *Chrysomyza Abietis* is described by Unger, in F. J. F. Meyen's *Jahresbericht*, &c., for 1839, a peculiar exanthem of the Fir. He states, that the leaves assume a yellowish red colour, owing to the presence of prominent, linear, rusty brown spots, without being themselves otherwise swollen. The yellow colour is more or less diffused on the upper side of the leaf ; but on the under side, besides this diffused colour, there are found one or more rusty brown spots, placed in a double row on the sides of the projecting leaf-veins. The situation of these spots corresponds, nearly always, with that of the Stomata. In the young state they are more opaque, and become when older more transparent, and more defined. The degeneration consists in a multitude of elongated vesicles, which are confined in a mucoid matrix containing granules, sometimes coloured, and sometimes colourless. This matrix forms an outer covering to the vesicles, and gives them occasionally a varicose appearance. They contain a yellowish grumous matter. The colour is not dissipated by boiling in alcohol. The disease commences in the stomata, which, in place of the air, contain a granular, mucous, at first uncoloured substance, which rapidly increases, becomes coloured in parts, and flocculent particles are formed in it. The vesicles appear, and it finally bursts through the cuticle. The course of the complete development of the disease lasts above a year.—*Abridged*, p. 92.

Valentin on Achyla prolifera.—With reference to *Achyla prolifera*, Valentin remarks, that this mouldiness, or colourless Conferva, very often recurs under favourable circumstances in animals. When occurring on the ova of fishes, it constitutes a very powerful preventive to their development, and its progress is so rapid that a single egg infected with it, will in a very short time infest many hundreds, and thus destroy them. He has ascertained, also, the same thing with regard to the ova of *Alytes obstetricans*. Its action upon the eggs of mollusca appears to be slower, which has been already remarked by Laurent.—(*Rep. V*, p. 44.) Valentin observed it, at all events, in a state of active growth for several days upon the ova of (probably) *Limnæus stagnalis*, during which period the embryo was in lively motion, and which did not die till later. In fishes, also, as the *Cyprinus nasus*, when kept in narrow vessels, and the water not quite sweet, he observed the same fun-

gus on all parts which might be abraded, as, for instance, the head and the tail.—*p.* 58.

[From the *Comptes Rendus*, 1841.]

*On a new Process for Anatomical Injections.**—M. Doyere, in a letter addressed to the Academy of Sciences, Paris, July 12, 1841, gives the following account :—I have employed for nearly two years, a very simple process for obtaining fine injections. This process, which I believe likely to render some service to the anatomy of structure, and probably also to pathological anatomy, essentially consists in causing to enter in the same vessels, *within a certain interval of time*, two finely filtered saline solutions, which, by double decomposition, give an abundant and opaque precipitate. This succession of two injections, is that which distinguishes my process from many others tried without success to obtain the injection of the capillary system by the same principle. I inject the second solution, as soon as the first has passed from the arterial system into the venous and lymphatic systems.

I have tried on animals a great number of insoluble salts, with a view to determine those which would give the most satisfactory results. I prefer to all others the chromate of lead. I first inject the chromate of potass, and am convinced that the order of injection is a point not to be neglected. A blue colour may be obtained by the precipitation of Prussian blue; brilliant red by iodide of mercury; white by the carbonate or sulphate of lead. The first has better succeeded with me than the carbonates and sulphates of lime and baryta.

The advantages which this process appears to me to possess over those in use, are above all to shorten the process of making fine injections, and to supersede any other preparation. It may be used with equal advantage cold or hot, in general or partial injection; the materials employed are unalterable, and may be consequently always ready. I will add, that the most minute injections required only a pressure which was evidently less than that of the heart's action. M. Poiseuille, to whom I made the process known several months since, in order that he might make use of it in his particular researches, has constructed an instrument by the assistance of which he can inject either liquid with that degree of pressure he considers proper.

By the assistance of this process, I have more than once succeeded injecting by the femoral artery in a single operation, and in a few minutes, the capillaries of the muscular system in an entire animal, the adipose and cellular systems of the white and grey matter of the

* Although the priority of discovering this process, and publishing the same, are decidedly due to M. Doyere, yet we must here state, that we have for upwards of twelve months seen injections of the corpuscles and Haversian canals in bone, the tubes on the fibre of some sponges, &c., similarly prepared by our esteemed correspondent Mr. George Busk, Surgeon to the Hospital Ship, Dreadnought. We can vouch for his not being acquainted with M. Doyere's process, the account of which bears date July 12, 1841.—*Editor.*

brain, of the conjunctiva, of all mucous membranes, intestinal villousities, &c. The capillaries thus injected by the chromate of lead are more filled, especially after drying, than by the injections of size, but less than by those of varnish (vernis); there also remains some doubt in my mind relative to the actual diameter of the latter canals. Those which run parallel to each primitive muscular fasciculus, to the number of four or six, appeared to me to possess, in the dog, $\frac{1}{300}$ th or $\frac{1}{400}$ th of a millimetre; but it is possible that their dimensions had been reduced by the action of one or the other of the two solutions employed, or that they had not been sufficiently filled. I am now engaged in determining the relation which exists between the size of injected vessels, and their size during life.

Bowman on the Contraction of Voluntary Muscles.—At the sitting of the Academy of Sciences, 27th September, 1841, Mr. J. E. Bowman, Demonstrator of Anatomy, King's College, London, stated, that he had sufficiently proved, that contraction never takes place in the whole length of a primitive fasciculus at the same instant, but that even the most violent contraction consists of partial contractions, which change their place with an inconceivable quickness.

Researches on the Reddening of Waters, and their Oxygenation by Animalcules and Algæ.—M. M. C. and A. Morren are of opinion that the oxygen of the air in water varies in quantity at different hours of the day. For example: in very sultry (insolation) days, the quantity of oxygen in the morning is 24 parts in 100; at mid-day, 48 parts in 100; and at five o'clock, from 60 to even 61 parts in 100. This effect is in relation with the respiration of animalcules, and aquatic Algæ. Among the bodies which produce this effect, there is an animalcule which the authors have made their particular study, and to which the name of *Discerea purpurea* has been given. It is one of a number which colour water red. The same authors have further examined the phenomenon attendant on the red colour of waters, and have enumerated forty-two plants and animals which redden liquids. They have particularly noticed the *Monas vinosa* of Ehrenberg, the *Monas rosea*, the *Trachelemonas volvocina*, the *Euglena sanguinea*, the *Hæmatococcus*, and the *Tessararthra*, of which they have given monographs. According to these observers, the famed *Protococcus nivalis* of the snow is an animal.—30th August, 1841.

M. Soleil presented a Microscope of M. Donné, to which he had added an Adjusting Screw, rendering it much more handy and useful.—July 19, 1841.

Laurent on colouring Hydra.—He has succeeded in colouring the Hydra blue, white, and red, by feeding them with indigo, chalk, or carmine; but he remarked that the eggs did not partake of the colouring, although the parent acquired a very vivid tint.—*Guerin's Rev. Zool.*, June 1841, p. 204.

Turpin on the Acarus of Pears.—Under the epidermis of the fruit of

some pears, Turpin once found a great number of the genus *Acarus*, of an oval shape, furnished with claws close to the beak, and four posterior filaments, presenting nothing very remarkable except four articulated legs, terminated by a single slightly-arched nail. The young individuals, after molting, assume their eight legs.—*Mem. de l'Acad. Instit. Paris*, 1840, p. 56.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

October 20th, 1841.—*Prof. R. Owen, F.R.S., &c., President, in the Chair.*

MR. THOMPSON, of Belfast, forwarded some Fossil Infusoria from earth, obtained at Cork.

Mr. J. Quekett read a paper “On the minute structure of Bat’s Hair.” After alluding to the views entertained by Hunter, Mandl, Busk, and others, as to the formation and mode of growth of hairs generally, the author stated that his attention was directed to those of the bat tribe, in consequence of having on more than one occasion used a knife to separate them from the skin; on subsequent examination it was seen that the curious markings on their surfaces, which render these hairs so interesting, were destroyed in some parts, but were still present in others. By repeating the scraping process, it was found that minute scale-like bodies were detached, which were not unlike in shape the scales on the wing of a butterfly, but were very much smaller, and presented no trace of striæ on their surfaces; it was on the arrangement of the scales, and on their being more prominent in some species than in others, that the beautiful appearance of bat’s hair depended. The scales might be procured either by scraping the hair with a knife, in a direction from the apex towards the root, or more easily by pressing them between glasses previously moistened by the breath. Many of them appeared to terminate in a quill, like that observed on the butterfly’s scale; some few were flat, whilst others were curved so as to fit the shaft of the hair, and presented a serrated edge. The scales were absent near the bulb, but abounded in all parts of the shaft situated above the skin; and when removed from many of the larger hairs, the fibrous nature of the shaft, and its cellular interior were well displayed. Mr. Quekett spoke of the hair of an Indian bat, of which a small portion had been given him by Mr. Powell, in which, without any preparation, the scales could be beautifully seen, both detached and still adherent to the shaft; and he was led, from repeated observation, to consider a bat’s hair as composed of a shaft invested with scales, which are developed to a greater or less degree, and vary in the mode of their arrangement in the different species of these animals; and concluded by stating, that bats resembled quadrupeds principally in their mode of reproduction, and birds in their mode of progression, but resembled both in the structure of their hair.

Mr. Bowerbank called the attention of the meeting to a source of fallacy he had detected in using strong solutions of salt and water, for

the preparation and preservation of animal tissues for microscopic purposes. He stated that he had recently been much occupied with observing the animal of the stony corals, which is exceedingly simple in its structure; and that he had observed numerous fasciculi, or networks of apparently small vessels in its structure, which had led him at first sight to arrive at conclusions as regards their formation. By accident he found that this network of apparent minute vessels, was due to the development of a *Confervoid* vegetable in the brine, of extreme delicacy.

Some discussion ensued on this subject, in which Mr. Owen and Mr. D. Cooper took part.

Mr. George Busk exhibited, after the meeting, a species of the genus *Acarus*, obtained from a pustule on a sailor's leg, which appeared to be a new species. The disease was contracted at Sierra Leone, by wearing the shoes of a West Indian. The matter was referred for further investigation.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

October 7th, 1841.—*Sir Henry Marsh in the Chair.*

THE minutes of the last meeting having been read,

Mr. Bergin moved, and Mr. Callwell seconded, that the first Thursday in November be considered the Anniversary of this Society; when a report from the Secretary of the proceedings of the year, and from the Treasurer as to the funds, shall be presented, and the officers for the ensuing year be elected. Agreed to.

Mr. Yeates presented the description of his Modified Compressor, an account of which will be given in a future number.

Mr. Moore presented a species of *Alga*, which he believes to be undescribed.

Mr. Ball exhibited some portions of mud, lining the valves of a dead specimen of *Cytheræa Chione*, taken up at Plymouth, July 1841, which contained a number of remarkable forms, accompanied by rough sketches of them.

The Right Honourable the Bishop of Meath was proposed by Sir H. Marsh, seconded by Dr. Croker, and admitted a member of the Society.

Notes on the Plants (?) exhibited at the meeting of the Microscopical Society of Dublin, on Thursday, 7th October, 1841, by Mr. D. Moore, were then read.

Polysiphonia fibrillosa (?) if not, new to our marine Flora. The microscope showed the ultimate ramuli of this beautiful species, beset with fibrillæ in a remarkable degree; the main filaments many-striated, and both kinds of fructification perfect. The specimens, which were collected at Malahide, are much smaller in all their parts than English specimens of *P. fibrillosa*, and further disagree in general appearance from them.

Gomphonema ampullacea. Greville. — This singular substance has twice occurred to Mr. Moore in great abundance; once in the North, and again in the West of Ireland. It appears to be in perfection from July to September.

Gomphonema paradoxa. Greville. — Frequent on the Irish coasts.

Isthmia obliquata (*Diatoma obliquetum*, *Lyngbye*). This beautiful object occurs abundantly in one or two places in the North of Ireland, but is very local. It is in perfection in July and August.

Fragilaria pertinialis. Lyngbye. — Collected in the county Westmeath, on Belvidere Lake, adhering to aquatic grasses in August.

Licmophora flabellata. Agardh. — This, when well displayed, is one of the most beautiful microscopic objects in the whole order of Algæ (Agardh), or Infusoria (Ehrenberg).

Diatoma fasciculatum. Agardh. — Frequent on the Irish coast: attached to other Algæ.

Microscopical Memoranda.

Topping's Objects illustrative of the Process of Felting.—We have recently received from Mr. C. M. Topping (whom we had occasion to recommend to the attention of microscopists at page 16 of our Journal) a set of *twelve slides*, containing the hairs of various animals, the fur or wool of which is used for felting. The objects are numbered according to their tendency to felt, and, independent of their being generally interesting as objects of structural beauty, they are the more so to those particularly interested in the subject as a branch of manufacture. We recommend the set to all classes of observers.

We observe that Mr. Topping uses strips of mahogany veneer, (instead of slips of glass) with a hole bored through the centre for the glass to fix the object upon. This is a decided improvement over the old plan.—*Editor*.

Organic Beings in Mineral Waters.—Dr. Lankaster communicated some additional observations on the existence of organic beings in mineral waters (*Athen*. No. 674). He had found the *Conferva nivea* of Dillwyn in the sulphur spring on the Water of Leith, near Edinburgh. He had also found it in the wells of Moffat in Dumfriesshire, Gillesland in Northumberland, and Middleton and Croft in Yorkshire. At Moffat he found great quantities of the substance called *glairine*, and was convinced of its organic nature. At Moffat also he found a pink deposit in the drains outside the wells, and, on submitting it to the action of the microscope, he found that it was produced by an animalcule, but much smaller in size than those which produced the coloured sediments of Harrowgate and Askern. It had the characters of a Monas, and was not more than $\frac{1}{15000}$ of an inch in diameter.—*Athenæum*, Aug. 7, 1841.

Insects voided with Urine.—The specimens kindly forwarded us by Dr. R. S. Hopper, of Leeds, which are stated to have escaped in large quantities *per urethram* from a female, appear to belong to the larva of a Dipterous insect of the genus *Stratiomis* (Westw. Classif. Vol. II, p. 551). The specimens are referred for further investigation.—*Editor*.

XXXIII.—DESCRIPTIONS OF THREE SPECIES OF SPONGE, CONTAINING
SOME NEW FORMS OF ORGANIZATION.*

By J. S. Bowerbank, Esq., F.G.S.

THE first specimen described in this communication, was a *Halichondria*, which the author has named *H. Johnstoniana*, in honour of Dr. Johnston of Berwick-upon-Tweed. The sponge is sessile, massive, and has a smooth encrusted surface, of a dark iron-grey colour; the interior is of a dull yellow colour, and much resembles the crumb of bread. This sponge is remarkable for the great variety in the forms of the silicious spicula, of which the author described three distinct kinds, each of which is characteristic of a separate part of the animal:—1st. Those of the skeleton, which are mostly simple and slightly curved, having hemispherical terminations; they are occasionally tri-radiate or multi-radiate, and frequently branched. 2nd. Those of the interstitial fleshy matter of the sponge; these are minute stellate bodies, having their rays attenuating regularly to their apices, the number of the rays varying from three to ten or twelve. 3rd. The spicula of the crust or surface of the sponge; they are very minute and somewhat fusiform, terminate abruptly, and have their surfaces regularly tuberculated. The author also described a fine vascular tissue, which he observed on the surface of the great excurrent canals. The gemmules are oval bodies, having a silicious crust, which is filled with minute spicula. This species was found attached to the Thatcher Rock, near Torquay, Devonshire.

The second sponge described belonged to the new genus *Duseideia*, proposed to be established by Dr. Johnston in his "History of British Sponges."

This species was sent from Sydney, Australia, by Rupert Kirk, Esq., after whom it is named, *D. Kirkii*. It is sessile, massive, and somewhat compressed. The skeleton is coarsely fibrous, and coralloid in appearance, having numerous *grains of sand* separately imbedded in its substance. The grains are not imbedded in the fibre from pressure through the external surface, but they occupy its very centre; each grain being separately encrusted by the cartilaginous matter of the skeleton, and the whole being surrounded by a thick coating of the same substance. The author described at length the mode in which this

* Abstract of a paper read at the Microscopical Society of London, Nov. 24th, 1841. Communicated by the Author.

curious structure appears to have been built up, and illustrated his descriptions by highly magnified drawings of the manner in which the grains are arranged in the fibrous skeleton. Spicula were of rare occurrence in this specimen; when observed, they were embedded in the external coating of the cartilaginous fibres; they are short, and comparatively thick in proportion to their length, decreasing very slightly from the middle to near the points, and are terminated acutely, but somewhat abruptly.

The third species is the *Spongia fragilis* of Montagu, or *Duseideia fragilis* of Dr. Johnston's manuscript.

It is massive, variable in form, of a dull ochreous yellow colour, and has the surface asperated by the projection of fibres, which contain numerous grains of sand, embedded in a manner similar to those described in treating of the last species. There are also other fibres, which are tubular in their structure, containing few or no grains of sand, but an abundance of spicula, remarkable for their great variety in form and size. No spicula were found in the fleshy matter of the sponge, but a considerable number of round or oval bodies were observed, which presented every appearance of being cytoblasts.

The author concluded his paper by some observations on the present state of our knowledge of the structure of the *Spongiadae*, and noticed certain changes that will become necessary in their systematical arrangement, when our information regarding their structure is more matured.

Drawings of the species described, and the various forms of spicula contained in their structures, illustrated the paper.

XXXIV.—OBSERVATIONS UPON THE IMPORTANT PART WHICH MICROSCOPIC ORGANISMS PLAY IN THE CHOKING UP OF THE HARBOURS OF WISMAR AND PILLAU; ALSO IN THE FORMATION OF THE MUD WHICH IS DEPOSITED IN THE BED OF THE ELBE, AT CUXHAVEN, AND UPON THE AGENCY OF SIMILAR PHENOMENA IN THE FORMATION OF THE BED OF THE NILE, AT DONGOLA, IN NUBIA, AND IN THE DELTA OF EGYPT.*

By M. Ehrenberg.

DURING the course of the year 1839, M. Ehrenberg made special researches upon the form of the mud-banks in the harbour of Wismar in

* Report of a memoir read to the Berlin Academy of Sciences, in March 1841, extracted from Professor Jameson's Edinb. New Phil. Journ., Oct. 1841, p. 386.

the Baltic, and arrived at the following result, which he communicated to the *Société des Amis des Sciences Naturelles*, on the 18th of February, 1840; namely, that from $\frac{1}{20}$ th to $\frac{1}{4}$ th of the mass of deposited mud consisted partly of living Infusoria, and partly of the empty shells of siliciously enveloped and dead Infusoria. Last year, 1840, he repeated these researches, and obtained a precisely similar result.

In the harbour of Wismar, according to the documents which were officially communicated by M. Rose, it appears that every week 36 lasts of this mud are deposited, every last weighing 6000 lbs.; so that it may be deduced, after seven and a half months of observation, that there is an annual deposit of 1080 lasts, or of 32,400 metrical cwts., or of 6480 cubic metres. For a century, and probably more, matters have proceeded in this way without interruption; so that during the last hundred years, there have been deposited by the running waters at Wismar, 108,000 lasts, equal to 3,240,000 cwts., or 648,000 cubic metres of this mud. Hence, then, supposing, which is very nearly correct, that $\frac{1}{10}$ th of this mass consists of visible organic matter, there have been deposited at Wismar, during the last century, of these microscopic silicious organisms, 64,800 cubic metres, or annually 648 cubic metres, which, when dry, cannot constitute more than $\frac{1}{10}$ th, and probably not more than $\frac{1}{40}$ th, or even less of the total weight.

The results which have been obtained at Wismar in the year 1840, suggested the idea to M. Hagen, to make similar experiments upon the deposits at Pillau, and to communicate his observations. The specimens of the deposits which he transmitted to M. Ehrenberg, are still richer in organized beings than those of Wismar. They often constitute, according to the result of forty experiments made upon different samples, one-fourth, and sometimes even a half of the entire volume. Hence it will follow, that at Pillau, also, there are annually separated from the running waters, from 7200 to 14,000 cubic metres of pure microscopic organisms, which in the course of a century would supply, in this place alone, a deposit of from 720,000 to 1,140,000 cubic metres of Infusory-rock or Tripoli-stone.

Both at Wismar and Pillau there are to be met with in the organized materials, some forms which are entirely new, and others which belong to the waters of the ocean. As it regards the last-named harbour, which is in the channel called *Pillau-Haffe*, the north wind often causes the sea-water to flow into the river.

M. Ehrenberg also alludes to the researches he made concerning the muddy deposits of the river Elbe at Cuxhaven, and which were submitted to the attention of the Berlin Academy in the year 1839. These muddy

deposits also appeared to be composed, to the extent of nearly half their volume, partly of Infusoria with silicious heads, and partly of Polythalamia with calcareous heads.

To these observations M. Ehrenberg now adds the results of his recent observations upon the mud of the Nile, the deposit of which has, from the remotest period, attracted the attention of the curious. He has purposely compared with this mud, African deposits procured from Daebbe and Ambukohl, in Dongola: from Tangeur, in Nubia; from Thebes and Gyzeh, in Upper Egypt: from Boulak, near Cahira; and from Damietta, in Lower Egypt. He has also in his possession specimens of the ancient deposits of the Nile, which M. Parthey and Lieutenant-General Minutoli brought to Berlin. In all these specimens he has found that the Sponges, the Silicious Infusoria, and, especially from the neighbourhood of Damietta, the calcareous Polythalamia of the arable districts on the margin of the Nile, existed in such vast abundance, that without going the length of asserting that they absolutely predominate, still it is a fact, that there is not a particle of this soil of the size of half a pin's head in which, making no allowance for the chemical changes which may have taken place, there was not one, and frequently many of these animals.

We may now, therefore, safely affirm, that the deposits in harbours, and even the accumulation and the extraordinary fertility of the mud of the Nile, and probably of all other river deposits, proceed not solely from the gradual destruction and mechanical transport of one portion of solid soil to the formation of another, no more than they are solely the product of the vegetation of plants; but, on the contrary, that they result from the immensely rapid agency, hitherto scarcely recognized as vital, of animal organisms, which are undiscernible to the naked eye, but whose quantitative and natural limits must henceforward be inquired into, and which, from this time, must be considered as possessing a very important influence upon these natural phenomena.

XXXV.—AN ABSTRACT OF THE “INFUSIONSTHIERCHEN” OF
EHRENBURG.—No. 5.

*By W. Hughes Willshire, M.D., M.B.S., Physician to the
Fore Street Dispensary, &c.*

FAMILY III.—VOLVOCINA.

POLYGASTRIC animalcules having a uniform body destitute of true ap-

pendages or members, provided with an envelope or lorica, dividing by spontaneous self-division into numerous individuals within the extensile lorica, and hence assuming a polypoid appearance. Lorica at length bursting, and allowing the several animalcules to disperse when they have arrived at the due degree of maturity.

The following is a Synoptical Table of the Genera :—

Organ of sight not present	Caudal appendage not present	Lorica single	Lorica roundish	Vibratile proboscis not present	} GYGES.
				Vibratile proboscis present		} PANDORINA.
			Lorica tabulated or compressed				GONIUM.
	Lorica double			SYNCRYPTA.	
Caudal appendage present		SYNURA.			
Organ of sight present	Self-division equal and perfect (forming no secondary polypoid masses)	Caudal appendage present	UROGLENA		
			Caudal appendage not present	Proboscis single	EUDORINA.
	Proboscis double	CHLAMIDOMONAS.			
	Self-division unequal (forming secondary polypoid masses)	Proboscis single		SPHAEROSIRA.	
			Proboscis double	VOLVOX.	

Genus—GYGES.

Eye and tail not present ; lorica single, urceolate, subglobose ; creature destitute of a vibratile filiform proboscis.

Only two species are described ; the several creatures within the common envelope being of a green colour.

Genus—PANDORINA.

Eye and tail not present ; lorica single, urceolate, subglobose ; creature provided with a vibratile filiform proboscis. From the peculiar mode of self-division, the polypoid-like mass has somewhat the form of a mulberry.

Species two : one is green, the other colourless.

Genus—GONIUM.

Eye and tail not present; lorica single, developing by spontaneous self-division, in flattened, tabelliform, and square polypoid masses.

Five species are known: four have green animalcules within the transparent general lorica, the other is colourless.

Genus—SYNCRYPTA.

Eye and tail not present; lorica double—clustering Cryptomonades enclosed within a common envelope.

Only one species is described: this is of a green colour.

Genus—SYNURA.

Eye not present; tail present, attached to the base of the lorica or to the centre of the polypoid mass.

Species one: of a yellow colour.

Genus—UROGLENA.

Eye and tail present; division of corpuscles simple and uniform.

After self-division has taken place once within the general lorica, the creatures resulting from such division do not divide into secondary polypoid masses.

Species one: creatures of a yellowish colour, with a red eye.

Genus—EUDORINA.

Tail not present; eye and filiform proboscis present; division of corpuscles simple and uniform.

Species one: of a yellow colour, and has a red eye.

Genus—CHLAMIDOMONAS.

Tail not present; eye present; filiform proboscis, double; division of corpuscles simple and uniform.

Species one: corpuscles green, with a red eye.

Genus—SPHAEROSIRA.

Tail not present; eye present; filiform proboscis simple; division of corpuscles compound and unequal.

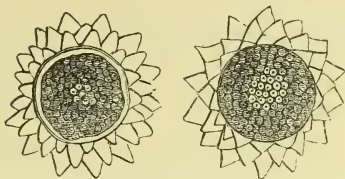
After general self-division has taken place within the common envelope, the creatures resulting from such division again divide, forming secondary clusters.

Species one: of a pale green colour; the eye is red.

Genus—VOLVOX.

Tail absent; eye present; filiform proboscis double; division of corpuscles compound and unequal.

Three species have been described: all of a green colour.



Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

Swäbe upon the Development of Boletus destructor.*—It first appears, according to him, as a fugitive growth (auflug) of a dirty green colour, consisting of fine, simple, microscopical filaments, somewhat transparent, and covered with minute, round, greenish germ-globules, and in this respect resembles the *Dematium virescens* (Pers.) This fugitive growth is converted afterwards into fine cobweb-like threads, interwoven with thicker branched filaments of a yellowish colour. Under the microscope both sorts of filaments appear colourless, exceedingly transparent and curved. One portion of them lies closely together, and they become glued in their position by a yellow resinous substance. The yellow branched filaments become gradually thicker, and at last assume the form of a rhizoma, with a brownish rind and transparent in the centre. The fibres in the latter resemble the colourless one above described. Those of the rind are more slender, less transparent, of a dark brown colour, and interwoven. The outer extremities of the rhizoma-like body, consist of very fine filaments, which have some resemblance to *Oscillatoria punctata*. In spring and summer, and especially in a moist atmosphere, they become, as it were, woven into a dry silky texture, on which the germ powder is again formed, whence a new growth of the Fungus commences.—p. 81, 82.

Mohl on the Colouring of Vegetable Membranes by Iodine.—From the numerous experiments of Mohl, which are recorded in the *Flora*, a universal Botanical Journal by Hoppe and Fürnrohr, and of which an abstract, too long for our limits, is given in *Valentin's Repertorium* 1841, it would appear, that colours varying from brown to blue, may be produced in all vegetable membranes, when placed in a condition to absorb a large quantity of Iodine. A yellowish or brown colour is caused by the application of the Iodine in a state of vapour, and a violet or blue by very concentrated solutions. He further concludes, that the reception of Iodine, and consequently the colouring, is in proportion to the consistence of the membrane. The weaker and softer, and more absorbent membranes, being the more ready to assume the blue colour. Schleiden agrees with these statements, and concludes, as was already

* Schlechtendahl's *Linnaea*, p. 194—200.

proved by his own and Vögel's experiments upon Amyloid, that Iodine is not a special re-agent for starch only, and that generally the blue colouring has no connection with chemical combination. He, however, is not disposed to allow, that only the consistence of part of the membrane regulates the absorbing power.

Crystals and other Inorganic Deposits in Plants.—The greater number of the white points visible on the outer integument of the bulb of *Muscari comosum*, consist, according to Goeppert, of larger cells, which are aggregations of four-sided prismatic crystals, placed nearly parallel to each other, and pointed at both ends. Payer also (Froriep's Notizen. No. 335, p. 65-68), has examined a number of these deposits in plants; as, for instance, in the leaf-stalks of several species of *Ficus*, *Parietaria officinalis*, &c., *Urtica nivea*, and *Forskalea tenacissima*. Others more cylindrical, in *Celtis Australis*, and *C. Missisipiensis*, and those in the leaves of *Morus nigra*, *M. alba*, and *M. multicaulis*. They are found at the base of the hairs in *Broussonetia papyrifera*, and *Humulus Lupulus*, and *Cannabis sativa*, and are peculiarly remarkable in the leaves of *Conocephalus Naucleiflorus*. A single large leaf of the *Broussonetia papyrifera* contains 134,000 of these concretions. Carbonate of lime is frequently met with in these deposits, between the cells of the parenchyma of the leaves, or their ribs, in the ducts of the leaf-stalk and its base. It is present in these situations, even in leaves of so acid a juice, that this would necessarily dissolve the carbonate of lime, were they in contact. Oxalate of lime, which is usually distributed in the leaves of plants, appears, as in the stems of *Cactus*, in transparent aggregated crystals, in the form of spheroids covered with points, and enclosed in a membrane, and sometimes also as octahedral or octangular prisms. *Raphides* consist of an investing membrane filled with oxalate of lime. *Silex* incrusts many vegetable membranes, and is seen also in the shape of orbicular concretions.

*Link on the Structure of Coal.**—Link (Froriep's Notizen, No. 320, p. 117-81) has established from comparative microscopical researches, that the greater part of coal originates not from mineralized stems, but from the peat or turf of the ancient world.—p. 79.

References to recent Foreign Works on the lower Cryptogamia.—For foreign information about the lower Cryptogamia, we refer our readers to:—

TURPIN.—Journal de l'Institut. No. 328, p. 126, "On the *Penicillium Biotii*, a species of Mould which is formed in solutions of Dextrine."

AMIDI.—Atti della prima ricenione degli scienziati Italiani tenuta in Pisa nell, Ottobre de 1839, Pisa, p. 157, "On the *Uredo Rosa*."

* We are informed by Mr. Robert Warrington, that from frequent observation of the extensive peat districts in Scotland and the north of England, he has long entertained the opinion, that the coal formation has originated from this source, which the investigations of M. Link fully confirm.—Editor.

GÖPPERT.—Uebersicht der arbeiten, &c., der schlesischen gesellschaft &c. für 1840, Breslau 1841, "On the structure of *Pisolithus arenarius*."

KÖRBER.—Id. p. 95, 99, "Upon the relation of the *Gonidia* with the *Soredia* of lichens."

[From Müller's Archives, 1841.]

On the circulation in the Infusoria.—Dr. Erol of Munich, in a letter to Professor Müller, says, "I have now very often seen and shown to my friends about here a kind of circulation in the Infusoria, a phenomenon so remarkable that I cannot but wonder that it is not mentioned by any microscopic observer. I find it most distinctly in the *Bursaria vernalis*, whose abdomen, you know, appears to be quite full of green globules. Of these globules, those which lie near the periphery of the animal are incessantly moving, whether the animal itself be still or not, in an elliptic current upwards and downwards. In this current three or four globules always lie close by one another, and move together with the stream. It has no relation whatever to the vivid ciliary motion that is constantly going on at the outer surface."—Heft. 3, 1841.

On the Development of the Hair. By Dr. G. Simon of Berlin.—All the investigations into this subject, which are possessed of any real value, are comparatively recent. For most that is important, we are indebted to the researches of Heusinger, Gurlb, Henle, Mandl, Busk, and Bidder; but many points have been still left undetermined, to some of which Dr. Simon has directed his attention.

Heusinger has stated that a black discolouration of the skin precedes the formation of the hair. Simon found this substantiated by the appearance of the skin in the embryos of the pig, and ascertained, as Heusinger had done before him, that this colour is produced by small black granules, which lie very close together. In some embryos this was not perceptible, while in others part of the skin was white, part discoloured. This difference of colour was owing to the presence of white corpuscles in the place of the dark granules. These bodies are formed of small sacs, running from the epidermis in a very oblique direction into the corium, which begin with a narrow neck, and terminate in a rounded pouch. They are in hair follicles, and are formed a considerable time before any hair can be observed in them. The only difference between the white and the dark follicle is, that the walls of latter, in addition to being formed of a granular matter, are furnished with a layer of pigment cells.

At the bottom of the hair sacs of some embryos six inches long, a dark mass was seen, perfectly distinct from the lining of pigment, and closely resembling in form the root of the young hairs. This mass too, was observed in some sacs unfurnished with pigment cells, and was composed of rounded granules in close apposition with each other, and very similar to the pigment cells in the rete malpighii of the human skin. Another circumstance, too, which renders it extremely probable

that this is the root of the young hair, is, that in no follicle containing pigment cells, was the mere point of a hair ever found, but the young hair always appeared complete, though very small. In those sacs which were not lined with dark pigment cells, the hair had the appearance of terminating in very minute fibres, but this was without doubt owing to the transparency of the cells of which the root of the hair is composed. Henle and Bidder's opinion, that the hair is formed from the cells at the bottom of the hair sac, is very probable, but most likely, the nuclei of the cells undergo the transformation into the fibres of the hair, and not the cells themselves, as Bidder imagined.

After the hairs have acquired such a length as not to be capable of being contained in the sac, they become bent into loops in such a manner, that while the point and root of the hair are near each other, at the bottom of the sack, the top projects out of the cavity. This condition of the hair existed in embryos seven or eight inches long; in others from eight to twelve inches in length, the points of the hairs, and part of their shaft projected from the sac, but were covered by a membrane which invests the whole foetus, and which was imagined by Isben to be a prolongation of the amnion. To this notion, notwithstanding some difficulties which oppose its adoption, Dr. Simon inclines.

In addition to the true sac, all the hairs of the embryo of the swine have a second investment contained within it, and analogous to that part which Henle termed the sheath of the root, in his description of human hair. This sheath is perceptible in hairs which are still entirely contained within the follicle, when it presents the appearance of a transparent line on either side of the hair. In no instance, however, were any traces of this sheath perceptible before the hair was formed. The sebaceous follicles connected with the hair sac, exist before the formation of the hair. They differ in structure from the sebaceous follicles in the full-grown pig, and consist of an elongated pouch, apparently divided into compartments by transverse lines, and occupying the upper part of the hair sac. One end of this pouch terminates close under the opening of the hair sac by a conical or elongated point, and its lower extremity is composed of an appendix of round granules bearing some resemblance to a bunch of grapes. When the hair follicle contains a young hair, this appendix is frequently divided by it into two lateral lobes, which project beyond the borders of the hair follicle on either side. Each of these lobes, which still retains the appearance of being composed of rounded granules, continues connected with the pouch, either immediately, or by means of a delicate prolongation, divided, like the pouch itself, into transverse compartments. Whether these sebaceous glands undergo subsequent metamorphoses, by which they are brought to resemble the condition of those parts in the adult animal, or whether new follicles are formed when the foetal hairs drop out, and the bristles begin to be developed, has not yet been ascertained.

Dr. Simon confirms the opinion that a distinct cortical and medullary substance exists in the hair; though when the hairs are black, the cortical substance presents as dark a colour as the medullary matter. He instituted experiments on the human hair to disprove Mandl's recent

assertion, that the tips of the hair are capable of being more or less perfectly reproduced; and lastly, by examining the development of the hairs in the embryos of the dog and calf, he has ascertained that his observations on the pig hold good with reference to other animals.—*Heft. 4. Transl. in Lond. and Edin. Med. Journ. 1841.*

[From the *Annales des Sciences Naturelles*, 1841.]

Lallemand on detecting Spermatic Animalcules.—M. Lallemand enters at some length into the pathological conditions connected with the evolution of spermatic animalcules in man, and points out the mode by which they may be detected under a variety of circumstances, a few abstract notices of which we subjoin:—After every discharge of the fluid, there remains always sufficient in the urethra for microscopic examination, a single drop of which affords myriads of animalcules in active motion; and as the fluid evaporates from between the plates of glass, the addition of water of the temperature of the body, renders their movements more free. M. L. also finds that the animalcules are always found in a living state in the urethra, some time after the act of coition; and recommends that the first drop of urine should be collected on a piece of glass, in order to view them in the best manner, as the warmth and dilution of the secretion by the urine, favour much the rapidity of their motions. The fluid so obtained is frequently mixed with mucus, prostatic fluid, and portions of epithelium. This test has been found of considerable importance to the physician.

Out of thirty-three subjects which M. L. examined after death, he only met with two cases in which he could detect the spermatic animalcules in the gland; the one died subsequent to a fall on the previous day, and the other of acute gastro-enteritis.

The microscope affords a very ready method of determining the nature of secretions from the urethra, though they become dried on linen. If a spot be supposed to be that of semen, and if it contained at the time of its emission spermatic animalcules, by moistening the same with water they are found to regain their former or original state, even after some years, and to possess the aspect and odour characteristic of the secretion. They may also be detected in urine, when the semen is voided with that fluid; in such cases they are to be found at the bottom of the vessel in which their presence is supposed, and if any mucus be present, on the surface of that substance.

[Those of our readers who may be further interested in this subject, are referred to the original memoir of M. Lallemand, as given in full in the January and February numbers for the present year.]

Glüge's method of detecting Urea in the Blood, after the removal of the Kidneys.—By the aid of the microscope, this observer can detect the presence of urea in the blood; for, says he, "Urea in its pure and crystallized state, forms fine needle-shaped, shining, or very slender quadrilateral prisms. After the kidneys were removed from rabbits, I ex-

amined the blood, having allowed it to rest for some hours, by the aid of a power of 255 times; and even twenty hours after extirpation, the blood *presented the two forms of crystallization of which I have spoken.*" In order to avoid every kind of error, experiments were instituted, and the results were always the same.—*Bull. Acad. Sc. and Belles Lettrés, Brux.* 1839, *Part I.* p. 302

Horkel read a paper at the meeting of the Academy of Sciences, Berlin, 17th May, 1841, "On the Microscopic Investigations made by Franciso Stelluti, in the beginning of the Seventeenth Century." This communication is not yet published by the Academy.

Apparatus for viewing the Circulation of the Blood in a very simple and ready manner, adapted for Public Lectures.—This apparatus is composed of a small box enclosing a frog, the tongue of which is easily placed for viewing the circulation of the blood, in the arteries, veins, capillaries, and even in the interior of the follicles. A compound lens is adapted to this box, opposite to a hole which allows the direct light of the sky, or that of a wax candle, according to circumstances, to fall upon it. A low power is sufficient to see the circulation of the blood in the interior of the tongue drawn out of the mouth of the animal, and spread like a membrane. One of these apparatuses presented to the Academy, was constructed by M. George Oberhauser; the other by M. Soleil, optician, after the pattern of M. Donné.—*Comptes Rendus*, 1841, p. 799.

Bibliographical Notices.

The employment of the Microscope in Medical Studies; a Lecture introductory to a course of Histology. By John Hughes Bennett, M. D., Lecturer on Clinical Medicine, &c., Edinburgh. Edinburgh: Machlachlan & Co. London: S. Highley. Dublin: Fannin & Co. 1841. 8vo. Pamphlet, pp. 27.

THE time has at length arrived, when it has been deemed expedient to institute a Class in Edinburgh, for instructing the rising members of the profession in the manipulation of the Microscope. This really becomes daily the more necessary, seeing that the scientific practitioners throughout Europe, are resorting at length to this means, with such acknowledged advantage and success. Dr. Bennett has passed some considerable time with Continental Microscopic Observers, and is fully competent to the difficult task he has engaged in, and in which we heartily wish him every success. It will be a matter of surprise to us, if the London Medical Schools do not appoint Professors for the same purpose; and this appears really the more looked for and demanded, seeing that the many sources of error which creep into the experiments made by the tyro, are too apt to cause him hastily to publish results, and thus render more confusion in the science than is necessary, which a few hints from one experienced in making such observations would

tend to obviate, and direct him in the proper path. Indeed, it is somewhat surprising, that the Senate of the University of London, many of whom have distinguished themselves as Microscopic observers, and have gained their laurels by the use of the instrument, have not made it requisite for students in human, vegetable, and comparative anatomy and physiology, to attend at least *one* course, even were it to consist only of *twelve* lectures on the Microscope. Such a proceeding in the Metropolis would materially lead to the most beneficial results, as it would create a desire for investigation among students and professors, who for the most part are ignorant of the *actual* appearance and nature of the structures, of which in theory they may be so well versed. The time is, we feel convinced, not far distant, when the Microscope will be considered as essential as the scalpel in the hand of the anatomist.

Dr. Bennett, in the pamphlet before us, has taken every pains to detail the ignorance which prevails among those who are fully conversant with book-knowledge, and the inspection of plates of structure, but who are entirely unacquainted with the objects themselves, and cites examples in substantiation of his assertions. He then enters, in a very general and popular manner, on the history and importance of microscopic investigations in the study of anatomy, physiology, pathology, and the practice of the profession; in which he gives an excellent though very general summary of the existing state of Microscopic Science in these departments.

To those interested in such details, we strongly recommend the perusal of this pamphlet, and again express our wish, that the laudable object Dr. Bennett has commenced, in the establishing of a Class for Microscopic research in Edinburgh, may be attended with that success it so richly deserves.

The Principles of Botany, Structural, Functional, and Systematic. By W. Hughes Willshire, M.D., Edinburgh, M.B.S., Lecturer on Botany at the Charing Cross Hospital, &c. London: S. Highley, Fleet St. 12mo., woodcuts, pp. 233.

THE work before us has been written with a view to supply a deficiency existing in treatises of Botany, for the student in medicine, and graduate of the University. Its title conveys its objects very precisely. The *structural* portion is replete with the most recent important information to the time of its publication, embracing the views of late promulgated by the German and French authors, given in a condensed and abstract form. As a consequence of the manner in which the structural portion is treated, the author's views of the *physiology* of plants deserve equal notice, and exhibit his intimate acquaintance with the subject. The *systematic* arrangement is essentially natural.

An abstract account is given of all those orders, under which the officinal plants are arranged, together with a list of those admitted in the London Pharmacopeia; the general properties of each order are given in a very general though condensed form, sufficient, however, to convey

the principle (which is all that is aimed at) of so important a branch of the subject.

From the reasonable price at which this summary of the existing state of Botanical Science is published, and the really excellent description of its matter, we must admit, the medical student has at length been supplied with all that can be desired.

The Entomologist. Conducted by Edward Newman, F.L.S. London : John Van Voorst, Paternoster-row. 1841.

THIS was the first of the Monthly Journals which appeared of the size and price of our own, and is devoted to the comprehensive Science of Entomology. We regret there have not as yet occurred in its pages any original observations on the structure of insects which we could notice ; it is chiefly confined to the description of species, and the record of notes connected with the capture of insects, and for these particulars recommends itself particularly to the attention of practical men.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

November 24th, 1841.—*N. B. Ward, Esq., F.L.S., Treasurer, in the Chair.*

DR. HASTINGS was elected a member.

A paper was read from the Rev. J. B. Reade, entitled "A Postscript to the Rev. J. B. Reade's paper 'On the process of Charring Vegetable Tissue, as applied to the Stomata in the Epidermis of Garden Rhubarb,'" in which the author, after alluding to the experiments of Dr. Williams, as communicated to the Society, in August last (see the whole paper, p. 118), which appeared to lead to the conclusion that the process of charring was of very doubtful efficacy in determining delicate structure, and that the overlying membrane in stomata was really nothing more than an inspissation of organic mucus, raised by heat into contact with the glass, and by the pressure extending as a carbonised pellicle from one edge of the aperture to the other. With reference to the point in dispute, the author forwarded with the communication a portion of cuticle, which, after being immersed in alcohol, distilled water, and dilute hydrochloric acid, was, when perfectly dry, examined by a high power, and the membrane distinctly seen ; it was more evident after the process of charring, and which process was so conducted as to obviate all error arising from pressure. The tissue was placed on a slip of glass, and submitted to the action of heat without being covered by another slip. Thus, both the supposed sources of error were avoided ; the one by the previous removal of organic mucus, and the other by a different manipulation. The paper was accompanied with sketches of the stomata, by Mr. Lens Aldous, the power employed being about 2000 linear. The author concluded by stating, that Dr.

Williams, after seeing the membrane under this power, immediately approved of the process which rendered it so distinctly visible.

Mr. J. S. Bowerbank then read a paper, being "Descriptions of three species of Sponge, containing some new forms of organization," a full abstract of which will be found at page 161 of this Journal. This paper led to much discussion, in which the Author, the Chairman, Mr. Dalrymple, Dr. Willshire, and others, took part.

On the table was the Microscope which the Council ordered for the Society from Mr. James Smith. This instrument possesses many modifications and improvements, both in the construction of its framework and appurtenances, and in its optical parts. We hope to be able at some future opportunity to give them in detail.

Microscopical Memoranda.

David Don on a peculiar kind of Organs existing in the Pitcher of Nepenthes distillatoria.—These organs the late Professor Don named "clathrophores;" they occupy the lower half of the inside of the pitcher, and have been described by Treviranus, Meyen, and Korthals. Doubts still exist as to their precise function; but it appeared to him probable either that they are the mouths by which the fluid is poured out into the pitcher, or that they are connected with the function of respiration.

The cuticle of the upper surface of the expanded part of the petiole of *Nepenthes distillatoria* is described as destitute of stomata; that of the under surface, as being furnished with numerous oval, or nearly orbicular stomata, composed of two semicircular cellules with rectilinear faces. That of the outer surface of the pitcher is also without stomata, but covered, especially in the young state, with long subulate hairs, frequently dichotomous, or furnished with a spur-like process at their base. The outer surface of the operculum is sparingly furnished with stomata, and clothed with hairs which are frequently branched and fasciculate; the inner has no stomata, but is furnished with clathrophores and clothed with hairs, which are often fasciculate, but mostly simple.

In *Sarracenia purpurea* the cuticle of the pitchers is described as consisting of sinuously-lobed and somewhat stelliform cellules, with numerous small, oval, closed stomata. The fibrous bundles are stated to be composed entirely of long pleurenchyma, the parenchyma adjacent to which consists of beautiful spiral cellules. The hairs of the inner surface of the operculum are simple, hollow, reflexed, subulate, and marked with numerous longitudinal parallel lines or striæ; they proceed from a somewhat elevated base. In the pitchers of *Cephalotus* the stomata are large, oval, and closed; the spiral vessels smaller than in *Nepenthes*, and containing only a single fibre; and the hairs which form the fringed border are simple, obtuse, and transparent.—*Proc. Linn. Soc.* 1840.

Organic Composition of Chalk and Chalk Marl.—The following Table, taken from Mr. Weaver's View of "Ehrenberg's Observations on the Organic Composition of Chalk and Chalk Marl," in Taylor's Annals of Nat. Hist. for June, 1841, p. 311, exhibits the number of Species of Infusoria, Polythalamia, &c., met with in the specimens examined by Ehrenberg:—

	Species of Calcareous Polythalamia.	SPECIES OF INFUSORIA.		Species of Silicious Plants.
		Silicious in Chalk.	Soft-shelled in Flint.	
The <i>Chalk</i> of				
Puskary contains	6			
Rügen	7	1		
Jütland	6			
Gravesend	6	3	5	
Brighton	7	1	4	
Menden	9	.....	2	
Cattolica	9			
The <i>Chalk Marl</i> of		Silicious	Infusoria	
Caltasinetta	7	27	.....	4
Oran	2	18	.....	1
Zante	5	8	.....	2
Greece	3	9	.....	1
The <i>Compact Chalk</i> of				
Egypt..	8			
Arabia	6			
The <i>Nummulite Lime-</i> <i>stone</i> of				
The Pyramids of Geza...	6	{ Containing 4 species of Num- mulites, the largest of which is one inch in diameter.		

Death of Mr. David Don.—It is with much regret we announce the decease of this talented and much respected Botanist and observer, which took place on the 7th of December, 1841, at ten minutes to One, A.M., at the apartments of the Linnæan Society, Soho Square. His remains are deposited in the Kensall Green Cemetery.

XXXVI.—DESCRIPTION OF MESSRS. POWELL AND LEALAND'S* NEWLY-
CONSTRUCTED ACHROMATIC MICROSCOPE.

THE daily acknowledged advantages arising to every branch of Natural Science from the use of the microscope, have induced us to present, after some years' experience, an instrument modified to the present improvements, and more within the reach of scientific observers, than that we have of late constructed, a full account of which, and figures of the one made for the Microscopical Society of London, will be given in a future number of this Journal.

In the following description almost every portion of the instrument is alluded to, and figures of the different parts appended; and it has been our object to give every individual credit for his improvements, where at least we consider them of such importance as to be placed on record.

The points most deserving of attention are the following:—The double pillar, as first made by Mr. George Jackson, which possesses the advantage of being lighter, and distributes the weight more equally upon the foot. We have also introduced a circular motion to turn the body off the stage to examine the object, and to change the object-glass to prevent it from falling upon the object. The stage is made larger and stronger than in former microscopes of this size, and the pinion and screw are of the same diameter as in the larger instrument, above alluded to. This description of stage was first constructed by Mr. Turrell. There are, however, two or three other improvements and modifications, such as the method for adjusting the object-glass to compensate for the thickness of the glass covering the object, &c., which will be found in the description of the Society's microscope.

FIG. 1. *The Microscope in the position for general use.*—The figure forms the frontispiece of this volume. As the most convenient method of using the instrument is in this position, it will be necessary after taking it out of the case, to turn it by means of the pillars on its

*Mr. Lealand, Mr. Powell's brother-in-law, has for some years been engaged with him in the object-glass and optical department, and is now publicly a partner with Mr. Powell.—*Editor.*

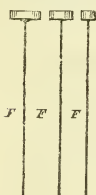
moveable foot, in order that the principal weight may be over one of the feet. When the person using it is standing, and the body of the Microscope perpendicular, it is then firmest as taken from the case.

A. *The coarse adjustment* for the body, which rests on two rollers, and is moved by a rack and pinion.

B. *The fine adjustment*, which is a screw with a cone, against which there is a spring pressing against the cradle, which carries the compound body.

C. *Milled head*, which moves the stage to the right and left.

D. *Heads that move the stage at right angles to the other.* (C) —There is one head on each side of the stage to this motion, in order that both hands may be employed at the same time, one on C, and the other on the opposite side, when a rotatory movement is required to search for animalcules, or other objects. When the two screws, C and D, are used together, a diagonal motion, and when separate, motions at right angles with each other are obtained.



E. *Arm for holding the stops*, F F F, which are used when viewing opaque objects. —To place them for use, push down the mirror G to the extremity of the stem; put the stop into the spring-hole, turn it into the centre of the stage, and raise it as high as the slide on which the object is placed will admit of.

G. *Mirror for illuminating objects.*—When the concave side is used it should be raised nearly to the stem, in order that the rays of light proceeding from it may reach the object before crossing, for by this means the most intense light is obtained. It is invariably used for opaque objects, together with the Lieberkuhn. At night it will be necessary to use the larger condensing lens, which should be placed at about its focal distance from the lamp, with its convex side to the mirror, and adjusted till the rays of light fill it.

H. *Spring-piece for holding the slides on the stage.*—The most convenient mode of placing them is, to push up the spring-piece sufficiently high to allow the slide to go on the stage, and then compress it until it holds it. Any number of slides of the same width may then, after it has been set, be put in without that trouble. Should the slides be very wide, in order to have the whole range of the stage, it will be necessary to observe if the centre of the slide corresponds with the line on the centre of the stage; if not it must be altered until it does.

FIG. 2. *Achromatic Condenser.*—This is adapted under the stage. It

will be observed there are two notches in the plate, capable of admitting the two springs on the condenser; put it in, and turn it till the milled head is in the best position for use; bring your object into focus, and adjust the condenser till you see distinctly the image of the lamp, or the frame of the window, if by daylight; and then you may be assured the most intense light is obtained, which is not always desirable. The light is lessened or diminished by turning back the condensing lens, by means of the milled head.

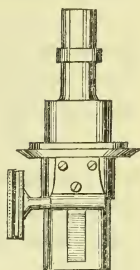


Fig. 2.

FIG. 3. *Micrometer for measuring objects.*—The upper part of the stage is taken out of the plate, put into the micrometer, and the whole put again on to the stage. To measure an object, observe that the micrometer stands at nought; then adjust one edge of the object till it comes in contact with the web in the eyepiece, by the milled head C; then adjust it across by the head of the micrometer D, when the number of revolutions and points may be taken.

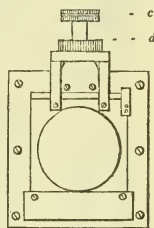


Fig. 3.



Fig. 4.

FIG. 4. *Plate on which Frogs or Fish are tied to examine the circulation of blood in the vessels.*

FIG. 5. *Large Stage, used when the Frog Plate is used.*

—To examine the circulation of the blood in the web of the foot of the frog, or the tail of a fish, it must first be enclosed in the bag; then fastened on the plate by the holes in either side of it; then tie some thread to about four of its toes, and spread the web out by fastening the ends through the holes in the plate.

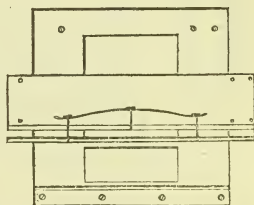


Fig. 5.

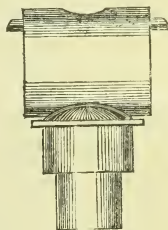


Fig. 6.

FIG. 6. *Phial holder for viewing Chara, &c. while in a living state.*—It is adapted to go in the plate of the stage, and is put in after taking the upper part of the stage off.

FIG. 7. *Small Condensing Lens for viewing opaque objects by direct light, the stem of which goes into the hole (I).—*

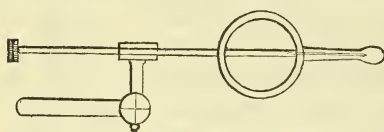


Fig. 7.

The larger lens should first be made to throw as intense a light as possible on the objects, and the small one should intercept

the rays at about two inches from the object. When the large lens only is used, which is the case when viewing opaque objects by daylight, it should be placed at about three inches from the object, with its plane side towards it: this produces light intense enough for many objects, without the smaller one; but when that is used, the plane side of the large lens should then be towards the lamp.



Fig. 8.

FIG. 8. *Diaphragm for cutting off extraneous light when viewing minute transparent objects.—*It is adapted under the stage, in the same manner as the achromatic condenser.

FIG. 9. *Diaphragm of French construction.—*Which is used in front

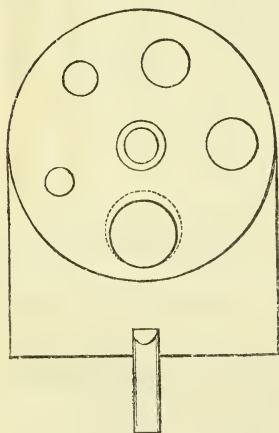


Fig. 9.

of the lamp, to cut off extraneous light, and intercept the rays before they reach the mirror. It goes into the stem of the *large* condensing lens, which is easily drawn out, and the diaphragm substituted. It should be placed at about eight inches from the mirror, and if an image of the aperture is obtained in the body, but a small portion of the field of view will be illuminated. The size will depend upon which aperture is used, and the relative distances of the mirror from the object, and the diaphragm from the mirror; it is useful, when any very delicate structure is to be observed, as the

darkness around the object renders the markings more distinct.

Adjusting Object-glasses.—These are made to adjust, in order that they may be as perfect for viewing objects covered with glass, as those that are not. As it is of material consequence that the object-glass should adjust to suit the various thicknesses of glass that are used, and as it is impossible to measure accurately the thickness, the best method to adjust the object-glass is this:—Place it at the point for viewing objects uncovered, which will be known by observing that the circular line under the word *uncovered* corresponds with the fixed line; or, the more ready

way is, to adjust it down as far as it will allow, as we always make them to stop at the corrected point. Bring the object into focus by the adjustment of the body, then adjust the object-glass till the upper surface of the glass which covers the object is in focus; this can very readily be done while the person is observing, by taking between the finger and thumb the milling on the object-glass, and turning it to the left; then bring the object again into focus by the body, and the adjustment is perfect. For the principle of this important method of correcting object-glasses for looking through glass, we are indebted to Mr. Andrew Ross.

FIG. 10. *Steel Disc, by which Drawings are made.*—To use it, place the body of the Microscope horizontally, take the cap off the eye-piece, push on the disk to the line marked upon the long eye-piece, and adjust it till the arm is horizontal.

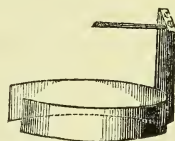


Fig. 10.

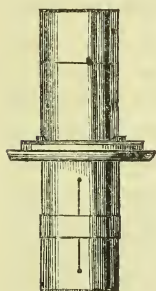


Fig. 11.

FIGS. 11 & 12. *Prisms for polarizing or decomposing the Light.*—One (Fig. 11) is adapted under the stage, in the same manner as the achromatic condenser, the other in the body of the Microscope, the draw of the body is taken out, and the prism screwed in, and the draw replaced. The polarization of light can be seen by turning round the draw in the body, or the prism under the stage: the latter is generally preferred as being the most easy.

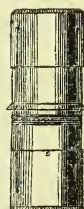


Fig. 12.

[The price of the Instrument above described varies from forty to sixty guineas, depending upon the number of powers and apparatus attached thereto; a very complete Microscope, however, of this kind may be obtained for about forty-five guineas.—*Editor.*]

XXXVII.—ON THE EXISTENCE OF CRYSTALS OF CARBONATE OF LIME IN THE EGG-SHELL OF THE ALLIGATOR.

By Dr. Henry Johnston, of Shrewsbury.

IN the September number of this Journal (p. 108), it is stated, on the authority of M. Turpin, that the particles of carbonate of lime which give substance to the shells of birds and reptiles, are deposited in confusion, molecule by molecule, and not in a crystalline form, as occurs in the eggs of *Cryptellæ* and *Helices*.

I am unable, at present, to obtain access to the original paper of M. Turpin, and therefore, to ascertain whether he examined particularly the egg-shell of the alligator; but I infer that, as one of the reptiles, his observation equally applies to that animal.

Some eggs of the alligator having recently been given to me, I was curious to examine the structure of the shell, and I was much surprised, knowing what M. Turpin had written on the subject, to detect in them, what appeared to me, decided indications of a crystalline arrangement.

The egg-shell of the alligator consists of two layers. The inner is thin and flexible, not at all crystalline, and indeed seems to be merely the inner membrane dried.

The outer layer is thicker and stronger than the former. Its exterior is smooth, and its interior studded with minute eminences, visible to the naked eye. These appearances may be seen in the following manner:

1. If the light be allowed to fall obliquely on the thin broken edge of this layer, minute shining points, or *facets*, are seen here and there, with the assistance of a single lens of low power,* or, still better, with the higher power of a compound microscope.

2. When viewed as an opaque object, with an achromatic power of about fifty linear, the inner surface is seen to consist of an irregular semi-transparent mass, having quite a crystalline appearance, although no regularly formed crystals can be perceived. Among the minute eminences above mentioned, many slender white fibres are seen, looking much like acicular crystals, but which are not, I think, really such.

3. The crystalline structure is best seen, by carefully crushing a portion of the outer layer in a mortar, and then examining the powder as an opaque object, on a dark ground, with a power of about fifty linear, or more. The particles are clear and transparent, almost like crystal; they are not amorphous, but have a great tendency to break into more or less regular fragments, bounded often by straight lines, and the fractures are clear and shining.

Although I have not been able to discover the regular rhomboidal crystals which M. Turpin has elsewhere detected: yet, I think it is proved by these observations, that the substance of the egg-shell here spoken of consists of particles of carbonate of lime, so disposed as to form not an amorphous mass, but a crystalline structure, such as we see in loaf-sugar, white marble, &c. The inside shell is almost entirely animal matter, and leaves but little residuum when burnt upon platinum.

It is with the greatest diffidence that I advance an opinion in any

* A Coddington lens of thirty linear.

way contrary to the conclusions of M. Turpin, I am however induced to communicate these few remarks, in order to draw the attention of English microscopists to the subject.

Hints to Microscopists.

III.—ON PRESERVATIVE SOLUTIONS FOR MOUNTING ANIMAL STRUCTURES.

By Daniel Cooper, Esq., Surgeon, &c.

Goadby's Fluid for mounting Animal Tissues.—Mr. Goadby, whose name is familiar to most of our readers, has lately received a gold medal, from the Society of Arts, for his fluid-preparation for preserving animal structures, and thus supplying at once a ready, cheap, and effectual means to the microscopist of mounting animal structures with the greatest possible ease and security, and affording the anatomist and physiologist that which has been for so long a time a great desideratum. The following is the receipt for making Mr. Goadby's fluid:—

- 4 Ounces of *Bay Salt*.
- 2 ——— of *Alum*.
- 4 Grains of *Corrosive Sublimate*.
- 2 Quarts of *Boiling Water*.

These ingredients are to be well stirred, and the solution finely filtered.

Preparations immersed in this fluid are reported to keep their colour well, even those possessing a very delicate rose tint. I have examined the blood-corpuscles, and various other normal and abnormal secretions, which had been preserved for upwards of a fortnight in it, without suffering any material alteration either as regards their form or colour. This solution is also applicable for preserving zoological objects generally. When mounting objects for the microscope, provided they are not thick, place a few drops of this fluid upon a piece of glass, on which the object has been previously put, and cover it with a portion of thin glass, wipe at the moment all the superfluous moisture from the edges of the surrounding glass, and by means of a brush apply japaner's gold size, so as to cover the upper and under glass to the extent of the eighth or sixth of an inch all round. By adopting this means, the fluid in which the object is placed is prevented from evaporating, and exercises its preservative influence over the enclosed object.

The Gannal process for preserving animal structures from decomposition, consists in injecting with, or immersing objects in, a solution of

the *super-acetate of alumina*. There is, however, the *same* objection, though to a greater extent, to the use of this fluid as to the salt water.

A *mixture of salt and water* was first recommended by Dr. Cook for the same purpose, and has been known for more than twenty years. There is a serious objection to the use of this solution for microscopic preparations, owing to the development of a *Confervoid* vegetable, as noticed by Mr. Bowerbank, at p. 159.

Mr. J. T. Cooper some years since made some experiments with a view to determine the best fluid for preserving vegetable coloured tissues, such as some of the smaller Fungi, and found that *salt and water*, to which *acetic acid* had been added, answered extremely well for this purpose. This solution might probably answer for mounting dissections of vegetable structures.

Kreosote and oil of copal, with the above, have likewise been tried, but have not been generally used, probably on account of the difficulty of obtaining the former free from colour, and the expense of both, compared to the simple ones above described.

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

Will on the Compound Eyes of Insects and Crustacea.—Some excellent researches, illustrated by good figures, have been published on this subject, by Will of Leipzig. The author found the investigation more convenient in subjects prepared in spirit than in fresh ones. The facets of the cornea are hexangular in all insects, but in Crustacea sometimes quadrangular, sometimes hexangular; quadrangular in *Palæmon serratus*, *Galathea strigosa*, *Astacus fluviatilis* and *marinus*, *Palinurus locusta* and *Pasiphaea squinado*; hexangular in *Squilla mantis*, *Pagurus bernhardus*, *Portunus pubes* and *Ilia nucleus*. The two eyes occasionally vary in size. In the *Libellula* the facets in the upper part of the eye are at least one-third larger than the rest. In the *Gryllotalpa vulgaris*, those on the border of the cornea are about one-third smaller than the others. The cornea is made up of prisms, or truncated pyramids, corresponding in number to that of the facets. Each pyramid presents, on a vertical section, oblique striæ, usually more than five, probably the edges of horny plates placed upon one another. In *Ranatra linearis*, *Naucoris cimicoides*, *Cicada orni*, *Tabanus bovinus*, there are found external and internal layers; the former transparent, the latter less so. The surfaces of both extremities of the corneal pyramids are always convex, or at most level, but never concave. In *Galathea strigosa*, *Palæmon serratus*, *Astacus fluviatilis*, and other Crustacea, the external extremities of these pyramids are very slightly convex, the internal even. In *Cetonia aurata*, *Melolontha vulgaris*, *M. fullo*, *Calosoma sycophanta*, *Dytiscus marginalis*, *Staphylinus erythropterus* and

Gryllotalpa vulgaris, both ends are convex; the internal, however, much more so than the outer. In *Locusta viridissima* both are very slightly convex. In *Mantis religiosa* almost even. In *Vespa crabro*, *Apis mellifica* and *Bombus*, convex, the inner most so. In *Æschna grandis*, *Agrion virgo*, *Libellula depressa*, slightly convex, the inner being much so. In *Cicada orni*, slightly convex, the inner strongly so. In *Cossus ligniperda*, *Sphinx Atropos*, *Pontia Brassicæ*, *Vanessa Urticæ*, *Musca domestica*, and *Tabanus bovinus*, slightly convex, the outer appearing more so. In *Apis mellifica* and *Vanessa Urticæ*, between the facets are observed simple hairs, which extend to the inner surface of the cornea, and are placed irregularly. In *Vespa crabro*, on the inner surface of the cornea, at the border of the facets, are formed short, rounded striæ, probably indentations. The number of facets in each eye are in *Galathea strigosa* 5400; in *Melolontha vulgaris* 6300; in *M. fullo* 9400; in *Calosoma sycophanta* 4030; in *Locusta viridissima* 2000; in *Bombus* 4000; in *Æschna grandis* 10,000; in *Cicada orni* 11,600; in *Cossus ligniperda* 8100; in *Sphinx Atropos* 12,400; in *Vanessa Urticæ* 4500; in *Musca domestica* 4900, &c., &c.—(To be continued, as soon as the next Part comes to hand.)

New form of vessels in Plants.—Under the name of *Dichotomous vessels* are described by Calamai (Annales des Sciences Natur., Vol. XIV, p. 317) certain constantly forked vessels in plants, which are probably identical with the so-called Latex vessels.—p. 75.

Bibliographical Notices.

Illustrations of Arts and Manufactures. By Arthur Aikin, F.L.S., F.G.S., &c., late Secretary to the Society of Arts, London. J. Van Voorst, 1840. 12mo, pp. 372.

THE materials this interesting little work contains, have been selected from a series of papers read before the Society for the Encouragement of Arts, Manufactures, and Commerce in London, by the much esteemed and respected Secretary, Mr. Arthur Aikin, who for twenty-four years held that office, and communicated many important papers, from which the work under notice has been written.

The subjects treated of are :—1, Pottery; 2, On Limestone and Calcareous Cements. 3, On Gypsum and its Uses. 4, On Furs and the Fur Trade. 5, On Felting and Hat-making. 6, On Bone. 7, On Horn, Tortoiseshell, and Whalebone. 8, The Antiquarian History of Iron. 9, The Metallurgical History of Iron. 10, On Engraving and Etching. 11, On Paper.

Of this list, there is one article which is interesting to the Microscopic observer, viz. the chapter on Felting. The various hairs used for this purpose are neatly figured from drawings made by Mr. Cornelius Varley. The micrometric measurements are added to the interesting matter which accompanies each figure, and adds very much to the general value of the work.

A special work on the Arts and Manufactures has long been a desideratum: this, Mr. Aikin has supplied so far as the extent of the present volume will allow. We can but speak in its praise, both as regards the style in which it is written, the manner in which it is got up, and the delicacy of the illustrations.

The Literary and Scientific Register for 1842. By J. W. G. Gutch, Surgeon, &c. London: Suttaby & Co., pp. 120.

THIS work, bound as a pocket-book, contains, in a condensed form, a variety of practical information in astronomy, botany, chemistry, medicine, meteorology, zoology, and science in general, and *blank ruled pages for a Meteorological Register*. As a compendium for general reference on scientific subjects, it is deserving a place in the pocket of scientific men.

Microscopical Memoranda.

Hair of the Moose-Deer.—In plate I. of the present volume, is a diagram representing the appearance of transverse and longitudinal sections of the hair of the Moose-Deer, forwarded by Mr. G. Busk; in them the *external fibrous sheath*, the *regular cells*, and the *internal enlarged cells*, which open into each other, may be well seen. This figure will be again alluded to, when Mr. Busk's notes and series of illustrations of the hairs of numerous animals are inserted.—*Editor*.

Gill's Notice of a similar Growth on the dead Larva of a Gnat, to that recorded by Dr. Stilling on living Frogs.—In reference to the case mentioned, at p. 139 of our Journal, by Dr. Stilling, "On the formation of Contagious Conferva (?) on living Frogs," we beg to state, that on referring to the Technological Repository, Vol. V., 1829, a similar growth is described and figured by Mr. Thomas Gill, which occurred on the body of a dead larva of a gnat. We extract the description, as given by this observer, for comparison:—"The production of transparent tubes, filled at their ends with small spherical bodies, was apparent; which tubes burst as the water gradually dried up, and these spherical bodies swam about in all directions in a lively manner, the ends of the tubes generally remaining empty, and quite pellucid; orifices or openings at their ends, through which the spherical bodies had been protruded, being also visible; the extremities of others were filled with these spherical bodies. Others of the tubes also ramified and divided themselves into branches, proceeding from the main stems." The rapid growth of these filaments is particularly referred to by Mr. Gill. He further adds (Vol. IV. p. 331), that the rudiments of these tubes were found adherent to those very recently dead, so that they seem to prey upon them in the manner of other parasites; and instantly upon their death, to commence their work of decomposition.—*Editor*.

Erratum.—At page 148, for "Scale $\frac{1}{8000}$ of an inch," read $\frac{1}{3200}$ of an inch.

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Myoderma.

2



M. glutinis farinula. Desm.

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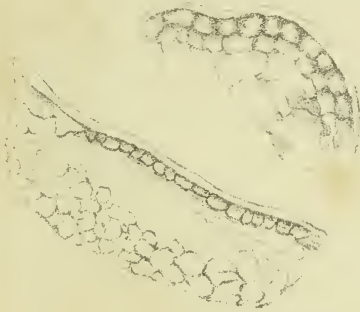
M. cervisiae. Desm.

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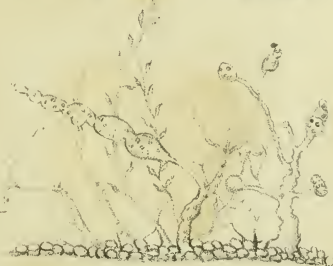
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Section of the Hair of the Moose Deer.

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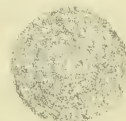
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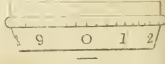
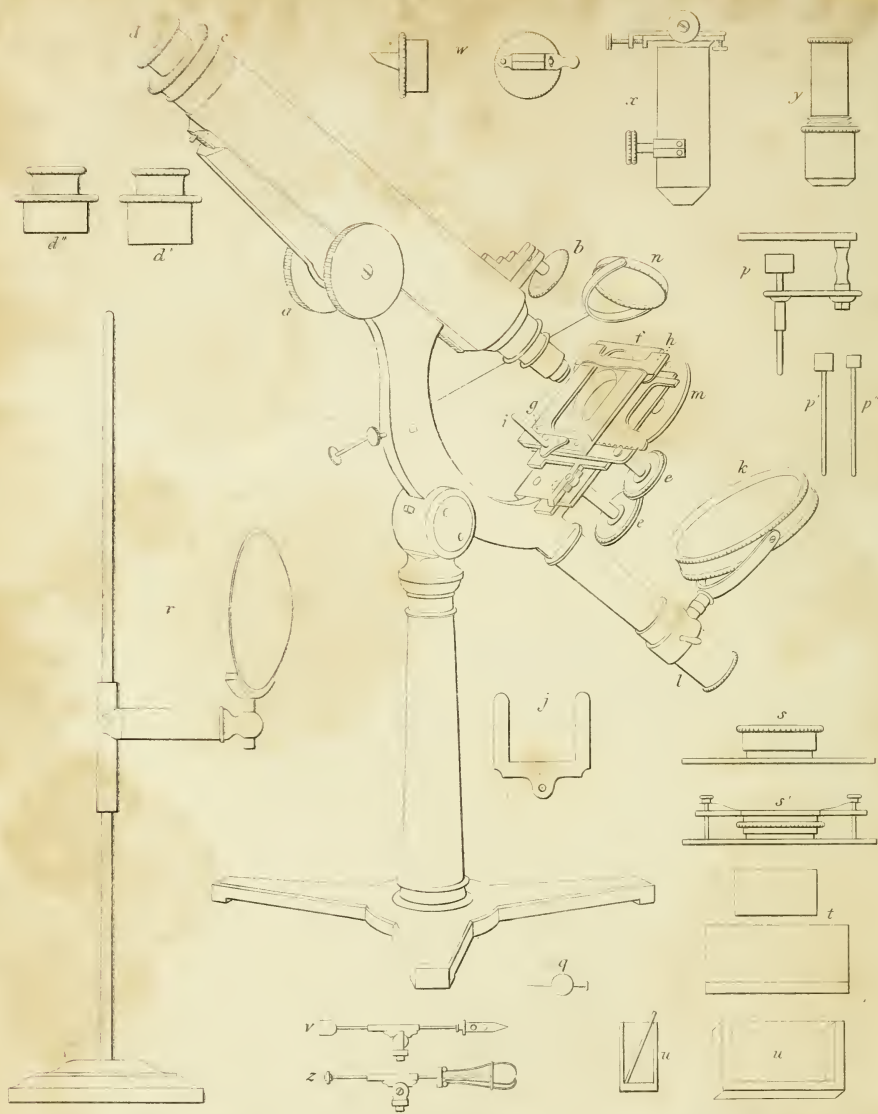
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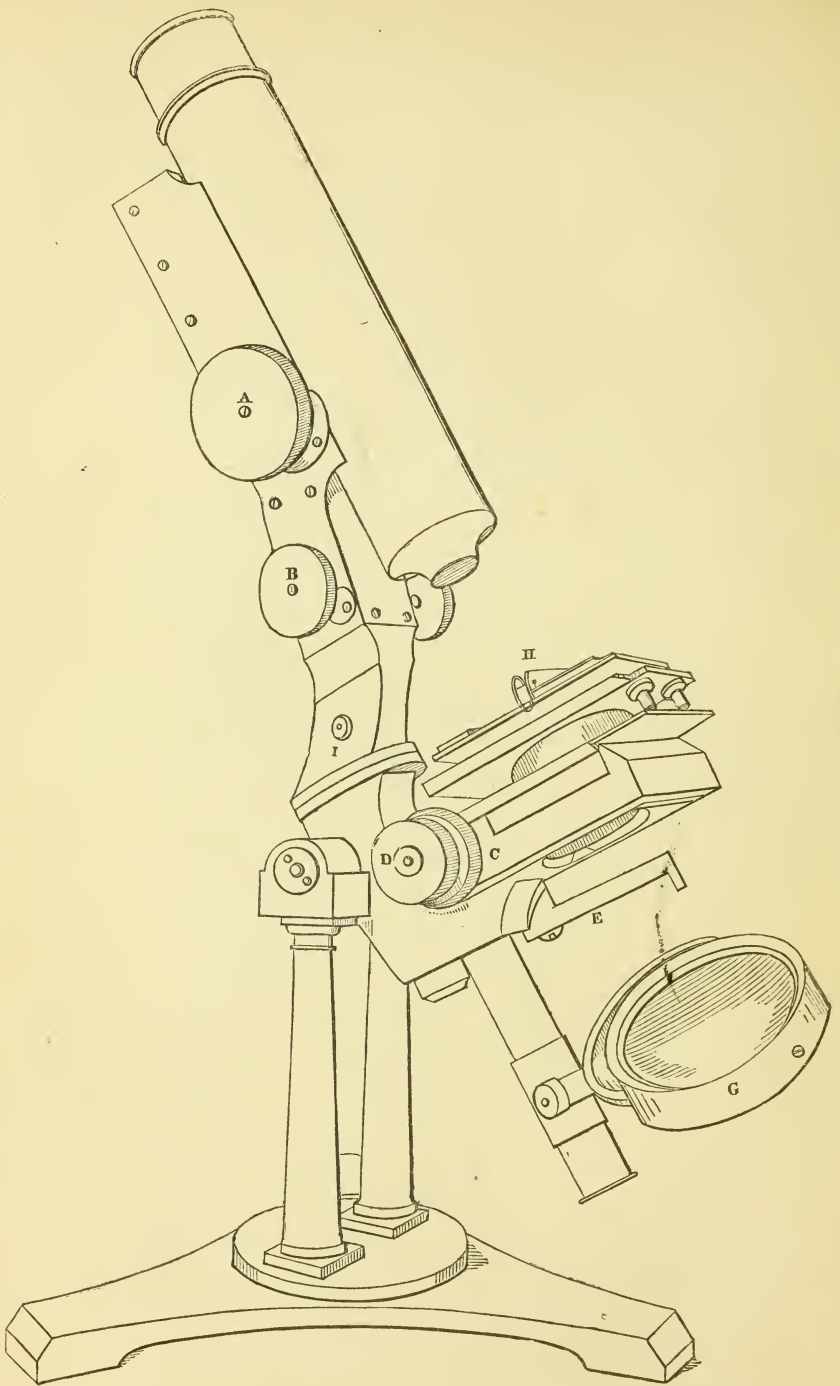
THE
MICROSCOPIC JOURNAL,
AND
STRUCTURAL RECORD
FOR
1842.

EDITED BY
DANIEL COOPER,
ASSISTANT-SURGEON, SEVENTEENTH LANCERS.
AND
GEORGE BUSK,
SURGEON TO THE HOSPITAL SHIP DREADNOUGHT.



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POWELL AND LEALAND'S NEWLY CONSTRUCTED MICROSCOPE.

ADDRESS.

THE MICROSCOPIC JOURNAL having now passed twelve months of its existence, the EDITOR, at the suggestion of many of the Subscribers, has resolved on doubling the number of its pages, which will, he trusts, in future enable him to cater to the tastes of the several classes of his readers with more advantage than he has been able hitherto to do. The various Sciences, now in a measure dependent on the employment of the Microscope for their elucidation, have become so numerous, that it is difficult at times to know how much of one, or how much of another to cull from the multifarious British and Foreign Journals, and Transactions of Societies continually on our table ; and while the most important and interesting articles have received early insertion, those of comparatively less interest have obtained a place later in the day, owing to the hitherto limited extent of our pages. As this inconvenience will for the future be in a great measure obviated, we wish it to be generally understood that our pages will constantly be open to the insertion of all communications of standard merit, whether published at home or abroad, with the object of placing in the hands of the Microscopic Observer, all the important facts

which are scattered throughout numerous works and Proceedings of British and Foreign Societies, with a view to render the MICROSCOPIC JOURNAL a monthly periodical of importance and reference to every explorer and lover of Science throughout Great Britain. To accomplish this end, the EDITOR respectfully solicits a continuation of that support and assistance he has hitherto received from his Correspondents.

CHATHAM,

22nd January, 1842.

THE

MICROSCOPIC JOURNAL.

I.—DESCRIPTION OF MR. JAMES SMITH'S NEWLY CONSTRUCTED
ACHROMATIC MICROSCOPE.

THE Council of the Microscopic Society of London came to a resolution some months since, to purchase for the Society an Achromatic Microscope of the first character, from each of the three most eminent makers in this country. The first of these was delivered to their order at the meeting in November 1841, by Mr. James Smith of No. 50, Ironmonger Row, Old Street, St. Luke's, and we are now enabled to give a figure and description of it. The second microscope was received by the Society from Mr. Powell in December of the same year, and has been described, with diagrams, in No. 12, of this Journal, and the third is about to be furnished by Mr. Ross, which we hope to describe in a future number.

The present instrument stands on a stout tripod pillar and joint, and may be planted at any inclination from vertical to horizontal: its whole construction is planned with a view to obtaining freedom from tremor; this being, when the higher powers are used, essential to beauty and distinctness of picture: it is mostly used with the body sloping, as represented in the figure, and with the light on the left of the observer.

The Body slides by a rack and pinion, moved by the milled-head, *a*, on a strong dovetailed bar; and has also a slow motion for delicate adjustment of focus, given by the milled-head, *b*, which is divided from 0 to 9, and alters the distance of the object from the glass about $\frac{1}{150}$ th of an inch by every revolution. It is furnished with a Sliding Tube *c*, graduated to tenths of an inch, for varying its length, and with three sliding Huygenian Eye-pieces, *d*, *d'*, *d''*, of successive powers.

The erecting (or field) Glasses, *y*, are to be screwed, when employed, into the other end of the Sliding Tube; they give the means of obtaining an extensive range of low powers, and besides rectify the image, which, when seen in the usual way, is inverted. The general view they furnish of an object, their advantage for dissecting, and the ease

with which the power may be at once raised by them from 5 to 80 or upwards, without any change of glasses, render them an interesting addition.

The Stage has two steady rackwork motions, at right-angles to each other and to the axis of the body, given by the milled-heads, *e*, *e'*: it has also a sliding and revolving Plane, *f*, with a ledge, *g*, for resting object-slips upon, and a sliding piece, *h*, with springs for clamping them, so as to allow them to be pushed horizontally. An upright Rod, *i*, is fixed on this plane for mounting the forceps, *v*, or for the Spring Holder, *j*, when a glass trough, *u*, is used. The plane may be detached from the stage if the rod is moved round an eighth of a circle to the left.

The centre of the opening of the stage will be in the axis of the body of the Microscope, if the ends of the two traversing projections are brought to be even with the corresponding fixed parts: then, if a glass slip, or any flat body contains the object to be viewed, it is lodged on the ledge of the sliding plane set horizontally, and the sliding piece above is gently pressed down upon its edge: next, by pushing the plane upwards or downwards, and the slip horizontally, the object is brought directly under the object-glass, and is adjusted more correctly by the nuts, *e*, *e'*.

When the forceps is to be mounted on the stage, the upright rod, *i*, should be carried round rather more than a quarter of the circle to the right, which is its most convenient position, and the plane is to be slid so as to allow good room for the object to be brought into the field of view. If the centre of the stage is now in the axis of the body, the plane may be turned round, and different sides of the object be exposed to the light without taking it out of the field.

A large double Mirror, *k*, concave on one side and plane on the other, with two actions, is supported by the cylindrical Bar, *l*, and may be moved upon it vertically or sideways.

A removable Diaphragm, *m*, is fixed under the stage, with a dovetail fitting; and by the different size of the circular holes in its revolving plate, the quantity and direction of the light thrown from behind upon transparent objects, may be extensively varied: when this plate is turned so as to close its central opening, the diaphragm forms, as a dark box, a back ground for opaque objects seen by a side light.

The Illuminating Lens, *n*, with motions detached from the stage, is for condensing this side light, and a silver side reflector is for the same purpose.

The three Lieberkuhns, *o*, *o'*, *o''*, adapted to the object glasses Nos.

2, 3, and 4, are applied by sliding them in front of each respectively. When one of these is used, the diaphragm is to be removed, and the dove-tailed piece, p , may be slid in its place, with one of the three Wells, p , p' , p'' , which will then make a dark background. Objects may, by moving the well aside, be viewed alternately as transparent and opaque; but should they be such as are mounted on circular disks, q , the well is not needed.

The Bull's-eye Lens, on a separate stand, r , is for increasing the illumination, if artificial light is employed.

The Camera Lucida, w , has its prism fixed on a short tube with a slight side motion for adjustment, and fits on each eye-piece when its cap is removed. In using it, the body of the Microscope should be horizontal, and the prism brought to that distance from the eye-piece at which the field is best seen: this is ascertained by looking perpendicularly through the opening of the prism while the tube is fitted on. If a drawing is to be made of an object in the field, the paper for it is now to be placed on the table under the prism; the image and the pencil may thus be seen at the same time upon the paper, and the tracing will be easily effected after a short practice. The size of the object traced may be found by placing on the stage in the field of view, a small graduated scale of known divisions, and marking the image of one or more of its divisions on the same paper.

Or when the magnifying power is known under which an object is seen, its measure is easily taken by fitting on the Camera Lucida, placing beneath it a scale of inches and decimal parts, at ten inches distance, and dividing the measure the object may subtend on this scale by the magnifying power; which gives the true dimensions.

One effect of the large pencil of light admitted by the object-glasses of high power is, that all parts of an object which are not correctly in focus, are indistinct or invisible: this necessary imperfection, however, gives an opportunity of estimating, by the revolution of the milled-head, b , the elevation or depression of the different parts that come successively into view on varying the focus.

An Achromatic Condenser, x , slides into the place of the diaphragm, to give the utmost refinement to the illumination of transparent objects.

A Live-box, s , is for observing living objects between two glass planes, and a second Live-box, s' , with screw collar, for objects in water. The screw is for regulating with nicety the depth of the fluid, and the degree of pressure that may be requisite to confine the object without injuring it.

A Plate of Glass, t , with a ledge, has a separate piece of thin glass

to lie upon it, for viewing animalcules, &c., in water; the fluid being retained between the two planes by capillary attraction.

A Glass Trough, *u*, is for larger objects in water. It is used with its thinner plate of glass in front, and commonly with a plane of glass placed diagonally in the trough as at *u'*; when, if what is introduced is heavier than water, it will sink till stopped by the sloping plate. Sometimes a very light folded spring may be applied with advantage behind the glass plate, and thin strips of glass at the bottom of the trough for keeping the plate in its place. The Spring Holder, *j*, should always be slid upon the rod, *i*, to confine the glass trough, and the body of the Microscope must be planted not very far from horizontal.

The Forceps, *v*, with cork at one end for such objects as are fixed on pins, is to be mounted on the rod, *i*, either in the direction as drawn, or inverted; thus providing additional means of varying the angle under which an object held by it may be seen; and giving in either way, very steady and easy motions. And a three-pronged forceps, *z*, is mounted in the same manner.

A pair of brass Pincers, steel Pliers, Knife, Point, and Scissors, three glass Tubes and glass Slips are also furnished; and all is packed in an upright mahogany Case fitted with Drawers.

The Achromatic Object Glasses provided comprise four Powers: viz.—

1st. (Fig. 1.) A Glass of $1\frac{1}{2}$ inch in focal length.

It is to be used alone only when a low power is required: when so used, the perforated cap *a* should be slid over it, the eye-piece of lowest power being applied, and the tube in the body of the Microscope little, if at all, drawn out.

2nd. (Fig. 2.) To slide upon the above instead of the perforated cap; the notch on its tube fitting to the pin on the first glass: they make together a glass of $\frac{8}{10}$ inch virtual focus.

The defining power is now much increased. The performance of this glass is little altered by covering an object with glass, or varying the length of the body.

3rd. (Fig. 3.) To slide in the same manner on the first, and with it equivalent to a glass of $\frac{1}{2}$ an inch focus.

4th. (Fig. 4.) A Compound Glass of $\frac{1}{4}$ inch focus.

Both these glasses possess great defining power, and especially No. 4, which has, at the same time, sufficient clear space in front

to allow fine illumination for opaque objects, and will adjust for such as are covered with thin window glass.

The two latter powers, No. 3 and No. 4, have the tube of their front lens moveable, and furnished with a Screw Collar, the circumference of which is engraved with ten divisions, numbered from 0 to 9, (*See Fig. 5*): this, and the graduation on the milled head for slow motion, give a means of obtaining the finest performance, under various circumstances, with great precision. For that purpose, the following directions are given:—

1st. When the tube in the body of the Microscope is not at all drawn out.

If the object is *uncovered*, screw up the collar (*Fig. 5*) of the object glass, till 0 stands opposite to the vertical mark on the tube, its three horizontal marks, each of which indicates one revolution of the collar, being all fully exposed. This is as far as the screw will go without strain, and is the correct place.

If the object is *covered* with glass, or talc, measure the thickness of this, taking advantage of dust or spots on the surfaces, by the milled head for slow motion: it has its circle divided like the collar of the object-glass from 0 to 9; every revolution being ten divisions. Multiply the number of divisions indicating the thickness by 0.6, if the $\frac{1}{2}$ inch object-glass (No. 3) is used; by 0.8 if the $\frac{1}{4}$ inch (No. 4). Then set the collar to the number that is the product, screwing it *down* from its former position, and pressing up the tube of the front lens; and the adjustment is made.

2nd. When the tube in the body is drawn out, increase the number to which the collar is set, with the $\frac{1}{2}$ inch glass (No. 3), as under:—

For 1 inch drawn out add ...	4	divisions.
2 inches	7.5	ditto.
3 ditto	10	ditto.
5 ditto	13	ditto.

The $\frac{1}{4}$ inch glass is little changed by lengthening the tube, but one division may be added for each of the first 4 inches drawn out.

* * The milled head for slow motion gives for the depth of $\frac{1}{100}$ th of an inch in air 15 divisions, in glass nearly 10.

A Table of the Linear Powers.

OBJECT-GLASSES.	EYE-PIECES.			
	No.1	No.2	No.3	
	POWERS.			
1½ inch. Tube of body } closed	26	48	67	The Erecting (or field) Glasses should only be used with the lowest eye-piece (No. 1); and in general, the $\frac{8}{10}$ ths inch object-glass is the most convenient, though for some occasions the 1½ inch, with its cap slid <i>partly</i> on, is better.
Add for each inch of tube drawn out...	3.4	5.6	7.2	
$\frac{8}{10}$ ths inch. Tube closed } Add for each inch of tube	57 6	98 10	155 16	With the $\frac{8}{10}$ ths inch object-glass— the tube being drawn } { the power is about out 0.5 inch } { 1 for a distant object. 0.75 „ } ...power about 5 1.05 „ } „ 10 1.7 „ } „ 20 2.9 „ } „ 40 4.1 „ } „ 60 5.3 „ } „ 80
½ inch. Tube closed ... } Add for each inch of tube	100 12	170 17	270 27	
¼ inch. Tube closed ... } Add for each inch of tube	200 21	330 33	510 51	each 0.6 inch of tube making a change of nearly ten in the power.

II.—ON THE OCCURRENCE OF GLOCONEMA PARADOXUM IN LOUGH ERNE, WITH REMARKS.*

By Captain J. E. Portlock, R.E.

THE Islands on the north shore of Lough Erne, are composed of a calcareous grit, which is a member of the carboniferous system, a distinct band of limestone and shale belonging to the lower portion of the carboniferous, a mountain limestone being geologically below it. Whilst examining these Islands geologically, I noticed attached to the rocks on the west shore of one of the smaller ones south of Boa Island, tufts of *Confervæ*, under the surface of the water. These were so lubricous, that it was with some difficulty I transferred a few pinches to a small bottle for future examination. On placing a portion of this under the microscope, I found it principally composed of one, or probably more than one, species of true *Confervæ*; *Conferva zonata* being abundant. On the nature of the articulations of these bodies, I shall offer some remarks at a future time. Surrounding, however, the filaments of the *Confervæ*, so as to form a sort of tissue or web, were at least

* Abstract of a paper read before the Microscopical Society of Dublin, 1841, communicated by the Author.

two species of *Fragilaria*, on which at present I shall say no more than remark, that the chains are formed in a more varied manner than is usually represented; the frustula being sometimes arranged in pairs, each pair being joined at an angle to the next pair, just as in the single rows; and again sometimes arranged end to end in a narrow band.

In addition to these bodies, I found as a very rare object, one of the *Tube-grain* animalcules of Ehrenberg, which I am inclined to place in the genus *Gloconema* of that author, or *Gloionema* of Agardh. The tubes are very delicate, transparent, flexible by heat, and destructible. The granules nearly semi-oval, but slightly rounded at the ends, having a patch of probably granular matter in the centre, and (in most, not all) two black spots nearer the ends. The spots and most of the matter disappeared on heating the glass, and also after long keeping.

In Fig. 1, Plate 3, is a highly magnified view of the tube and granules, as they appeared to me when nearly fresh; and in Fig. 2, a view by my friend Capt. Jones, M.P., a most careful and experienced observer, of one of the granules when long kept. In it, by carefully adjusting the sight, he discovered the transverse striæ.

Considering this a *Gloconema* (*Gloionema*), there is some difficulty in deciding the species, more especially as Lyngbye's figure, referred to by Agardh, cannot at present be here consulted, no copy of his work being in Dublin. *Schizonema prostratum* (Grev.) is given by Harvey with a note of interrogation as to the genus; it certainly does not appear to belong to *Schizonema*, and in the form and arrangement of its granules, has some analogy to the present species; but in habit, forming "on the boards of a sluice a very thin brown mucous stratum," it essentially differs from it. *Gloconema paradoxum* is described as having "a semi-ovate, curved, striated lorica, enclosed in hyaline tubes, which are simple, or rarely branched," and was found by Ehrenberg abundantly in *Conferva rivularis*. In parasitic habits, therefore, it agrees as in form with one species; and although I was at first disposed to consider it new, I must now content myself with recording *Gloconema paradoxum* as an inhabitant of Lough Erne. Capt. Jones made the length of the lorica $\frac{1}{2500}$ th inch; but in some of those I examined, the length was certainly very much greater; and Ehrenberg states it to vary, in his specimens, from $\frac{1}{2300}$ th to $\frac{1}{810}$ th.

Explanation of the figures, Plate 3, Fig. 1.

- A. Tube and granules, highly magnified, of *Gloconema paradoxum*.
- B. Single granule. A lorica, highly magnified, showing the striæ.

III.—AN ABSTRACT OF THE “INFUSIONSTHIERCHEN” OF
EHRENBERG.—No. 6.

By W. Hughes Willshire, M.D., M.B.S., Lecturer on Botany at
Charing Cross Hospital, &c.

FAMILY IV.—VOLVOCINA.

POLYGASTRIC animalcules, having a filiform and uniform body, destitute of true appendages or members, and unprovided with a *lorica*; spontaneous self-division transverse and imperfect; hence the creatures are connected in cateniform clusters, or little chains.



The following is a Synoptical Table of the Genera :—

Articulated pieces straight, the joints rectangular and transverse	{	Inflexible	BACTERIUM.
		Flexible ...	VIBRIO.
Articulated pieces spirally twisted, transverse division, being oblique	{	Flexible	SPIROCHOETA.
		Inflexible {	Form extended cylindrical .. SPIRILLUM.
			Form compressed disc-like... SPIRODISCUS.

Genus—BACTERIUM.

Animalcules connected in filiform chain-like clusters, which are rigid and inflexible.

Three species are described : they are all devoid of colour.

Genus—VIBRIO.

Animalcules connected in filiform chain-like clusters, which are flexible, and often present a tortuous appearance.

Three species are known, which are colourless.

Vibrio rugula is a species which is very widely distributed, and is probably one of those animalcules which first attracted the notice of early microscopical observers. Its motion is quick and serpentine, and is met with in infusions. *Vibrio lineola* is often to be met with close to the stalks of flowers when placed in water.

Genus—SPIROCHOETA.

Animalcules connected in a spiral manner, the cluster or chain being filiform, flexible, and tortuous.

One species, which is colourless, has been described.

Genus—SPIRILLUM.

Animalcules connected in a spiral manner, the chain, though somewhat bent, being rigid and cylindrical.

Three colourless species have been described.

[We may here remark, that the Spermatozoa of many of the lower orders of plants have been looked upon by some observers as belonging to the present Genus. Of the propriety of this arrangement we think there is much doubt.]

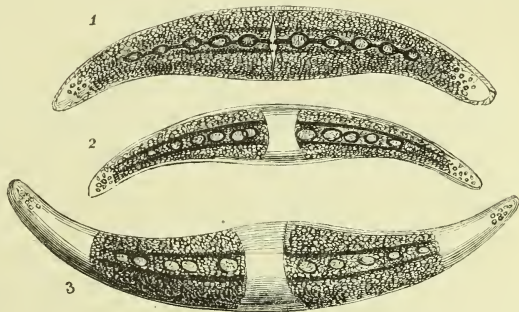
Genus—SPIRODISCUS.

Animalcules connected in a spiral manner, but the pieces of the spire are compressed and disciform.

One species is known : this is of a yellowish brown colour.

FAMILY V.—CLOSTERINA.

POLYGASTRIC animalcules having a uniform body, destitute of true appendages or members. Like the Cryptomonads they are provided with an envelope or lorica, which, along with the proper body of the creature, undergoes spontaneous but imperfect self-division ; the



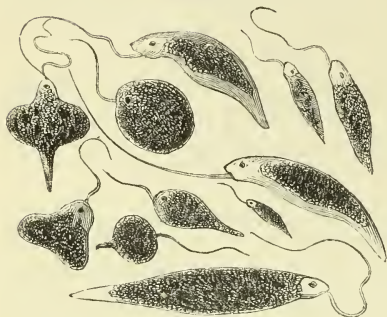
clusters hence assuming a bacillate, filiform, or fusiform appearance. In this family but one Genus is included, viz.,

Genus—CLOSTERIUM.

This Genus is divided into two sub-genera—

1. Smooth Closterina CLOSTERIUM.
2. Rough Closterina TOXOTIUM.

In each sub-genera exist eight species, the internal granular matter of which is mostly of a green colour, variable in its hue.

FAMILY VI.—*ASTASIÆA*.

POLYGASTRIC animalcules destitute of true appendages or members, possessing no covering or lorica, but endowed with the power of changing the form of their body at will; having a single aperture, and sometimes a tail. The proboscis is single or double.

The following is a Synoptical Table of the Genera :—

Organ of sight not present				ASTASIA.
Organ of sight present	Eye single	Free	With one proboscis	{ Caudal appendage not present AMBLYOPHIS.
				{ Caudal appendage present ... EUGLENA.
			With two probosces..... CHLOROGONIUM.	
		Attached by a pedicle..... COLACIUM.		
		Eye double	DISTIGMA.	

Genus—ASTASIA.

Animalcules free; tail present; visual organs not apparent.

Five species are described: one is first of a green colour, afterwards passing to a blood-red; two of a constant green colour; one yellow; and the other is colourless.

This Genus contains animalcules, which, by their rapid generation in countless multitudes, and their red hue, can change the colour of a large mass of water to a blood-red tint, and hence have sometimes given rise to considerable alarm, near the waters where they propagate.

Genus—AMBLYOPHIS.

Animalcules free; eye present; proboscis simple and filiform; caudal appendage not present.

One species, of a green colour, is alone described.

Genus—EUGLENA.

Animalcules free; eye present; proboscis simple and filiform; caudal appendage present.

Eleven species are known : nine are green ; one is first green, and afterwards red ; the other is colourless. The eye is of a beautiful red colour.

Genus—CHLOROGONIUM.

Animalcules free ; eye present ; proboscis double ; tail present.

One species, of a beautiful green colour, is alone known.

Genus—COLACIUM.

Animalcules fixed by a pedicle ; pedicle either simple, or, in consequence of self-division, branched ; eye present.

Two species are described : they are of a green colour.

Genus—DISTIGMA.

Animalcules free ; possessed of two eyes.

Four species are known : one is green, one yellow, two are colourless.

III. — MICROSCOPIC RESEARCHES ON THE STRUCTURE OF THE
WINGS OF LEPIDOPTEROUS INSECTS.*

By M. Bernard Deschamps.

THE facts enumerated in the succeeding pages, principally relate to the structure of the *scales* of butterflies. It is known that the wings of Lepidoptera, like those of all insects provided with such organs, are fixed to the upper and lateral parts of the thorax, and are formed of two very thin and transparent membranes, in the interval between which, nerves of a horny consistence ramify, the largest having their origin at the points of insertion between the wings with the thorax. These nerves are canals of an oval form, the diameter of which diminishes as they arrive towards the apex of the wing. Each of them is traversed, throughout its whole length, by a canal known as a hollow trachea, and which anastomoses repeatedly with other very small canals, of the same nature. These several *tracheæ*, appear to receive the air from the interior of the body of the insect, the use of which is stated according to Swammerdam, Chabrier and Jurine, to distend all parts of the wing during the action of flight.

It is upon these membranes comprising the wings of Lepidoptera, that is fixed the scaly dust which covers them. Before the invention of the microscope, it was believed that this dust (impalpable), detached

* From the *Annales des Sciences Naturelles*.

by the slightest rubbing, was a mass of irregular bodies of small dimensions; but since, it has been discovered that the small particles of which they are composed, are very small implanted scales, each possessed of a pedicle, and covering both surfaces of the wing on which they are arranged one over-lapping the other (imbricated) in the same way as the slates and tiles of houses. The variety of forms these scales assume are well known, and have often been described and figured. Swammerdam, the elder Bonanni, Réaumur, Lyonet and several other entomologists have given very exact representations of them in their works, but it does not appear that any of them have attended to their extraordinary structure. The comparative observations I have made for some time, with a view to arrive at a knowledge of these scales, led me to imagine that they were not similarly constructed, especially as regards the number of membranes, the granulations, and striæ which cover them. In the perfect state of the scales, it is difficult to determine whether they are composed of one or many membranes, but as they are frequently found in an imperfect state, these defective scales place in the hands of the observer the power of studying their conformation.

All the scales which cover the wings of Lepidoptera, appear to me to be formed of two, and frequently of three membranes or lamellæ, placed one on the other. It is the upper membrane, on which are always found the granulations composing the coloured matter of the scale. The figure of these granulations is very regular; they are round and sometimes slightly elongated; their number is frequently considerable, and the scale is entirely opaque. When striæ are present, they are always placed on the second lamella. It is very difficult to rest satisfied as to the existence of these striæ on a large part of the opaque scales, as the edges on either side of the pedicle are frequently transparent, and do not allow of their being seen. Sometimes they are irregular, consisting of cylindrical portions arranged on a membrane at unequal distances, though always parallel; they are frequently exceedingly regular. They may be observed either as small parallel cylinders placed at regular intervals, such as may be seen on a part of a scale; or of equally parallel lines formed of granulations resembling small round or oval pearls. It frequently happens that these beautiful striæ are alternately opaque and transparent, as was noticed in a portion of a scale taken from an exotic butterfly. At other times, between each of them may be seen, intervals divided in small squares. When these intervals are larger, the squares which they form, are observed to be transversely elongated. In another scale taken from an exotic butterfly, *le P. N. Teucer* Fabr. (Cramer, Pl. 51. A.B.), may be seen on the

regular striæ a series of small pearls producing the effect of a light embroidery. There cannot be a doubt but other observations made with a greater number of butterflies will discover scales of various conformations, and which may be even more interesting than those alluded to.

It however appears constant that all transparent scales on which striæ are to be found, without any traces of granulations, have two layers. Those on which the regular striæ are very near to each other, for example running together, have never left any uncertainty on this point in my mind. It has not been the same, relatively to other equally transparent scales, in which the striæ having a very slight adhesion to the membrane which receives them, are easily removed from it. Among the scales of this description I have cited those very large ones which are found on the exotic butterfly, *Thelemachus* (Cramer, Pl. 373). The striæ there observed, the number of which frequently exceeds one hundred in one scale, are composed of small cylinders, which may be compared, as long as they are entire, to the stretched strings of a harp or piano, and which in the contrary case have the effect of the same ruptured or detached chords, allowing the broken extremities to be seen. Nothing proved to me the existence of a double membrane in these scales more forcibly, than the intervals between the striæ never exhibiting any trace of tearing in the situations where they were wanting; that may, indeed, arise from the adhesion of the two lamellæ. New observations have led me to conclude that these lamellæ really exist, but that the upper one on which the striæ are found, is so delicate that it is difficult without much trouble to see it, and only on a very small number of scales. The regular undulations frequently observed between the striæ of these scales, and which are sometimes found wanting in the part where these striæ have been raised, have much contributed to clear up in my mind their conformation.

It is on the upper layer of the wings of Lepidoptera that the scales are placed, and on which is deposited the granulations producing the coloured matter, rendering them more or less opaque, and that the lower membrane appears to be always marked with striæ. This conformation, which appears constant, once received, obliges me to admit a third layer; otherwise, the scales, on which are observed striæ without granulations, would have but a single one, which is contrary to observation. It may, undoubtedly, be urged as an objection, that it may be possible for the membrane to be covered both with granulations and striæ, and this opinion may still be conceived on the examination of the opaque scales in part denuded of their striæ, the lacunæ of which frequently exhibit, in a very clear manner, the raised granula-

tions of the striæ. This appearance is explained by the intimate union of the two lamellæ, and which in similar and very frequent instances, would lead to the belief of the existence only of a single membrane. This objection raised by myself, led to the necessity of further examination, and the discovery of certain scales exhibiting the defects above described, proved that my idea was not well founded. To wit, the portion of the *ladite* scale in which were found the granulations, clearly showed the existence of a superior lamella, of which the visible rupture is proof complete, and that which has been raised led to the discovery of very regular striæ which concealed it. It appears to me that this last portion may be likened to the scales which present striæ without granulations, and on which the existence of a double membrane is shown. That of a third lamella does not appear to me, after this, to be able to be contested. It was seen in the same scale in the situation where the striæ appeared to have been raised; from these data I was led to believe that three laminæ existed in all scales, and in those not possessed of any trace of granulations, the upper membrane is so transparent, that it obscured nothing of the clearness of the striæ. This opinion, in harmony with the regular progress which generally follows nature, may perhaps be confirmed on more extended observation.

It frequently happens that the lamellæ composing the scale, and which are united by a more firm edge than the other parts, are slightly tinted of a reddish brown colour, appearing at first sight to penetrate its substance. On examining these membranes with a high power, it is obvious, that this tint is due to a number of irregular points which arise from the transparent ground. Slight striæ may also be there perceived, although difficult to be distinguished. It is probable that these granulations and striæ, frequently uncoloured, are always found, according to the laws of organization of the scale, the first on the upper laminæ and the others on the intermediate one.

(To be continued.)

Extracts and Abstracts from Foreign Journals.

[From the *Comptes Rendus*, 1841.]

Laurent on producing the pustular Disease of the Hydra at will.—Having at length studied the influence of atmospherical circumstances on the production of the pustular disease to which the genus *Hydra* is subject, I have arrived at the point of preventing or favouring this disease, when I am desirous of showing that the pustules are not testicular

organs, and that the liquid which escapes, although containing zoospermoid vibrating corpuscles, cannot be considered as performing the office of the sperm.—21st June 1841, p. 1171.

Bazin on the Genital Organs of Bothrydium Pythonis.—The genital organs of this worm, which were first described by M. de Blainville, are to be met with by opening several of the rings on the ventral surface, they will then be found filled with a substance apparently granular, when viewed with a powerful lens. The microscope exhibits it to be entirely composed of ovules, the great diameter of which is about 0.078 of a millimetre, and the smaller diameter about 0.048 of the same measure. He has as yet only observed a single ovary and one oviduct; but considers it nevertheless probable, that a male organ is equally to be found there.—4th Oct. 1841, p. 730.

Zaddach on the Anatomy and History of the Development of Apus cancriformis.—This thesis is divided into three parts: In the first the author gave a very minute description of the external parts of the animal, although he remarked that Schœffer, who first described the species, had already given the same with care. The second part comprised the anatomy: the author commenced by detailing the muscular system, passed then to the organs of digestion, circulation of the blood, and cited the observations he had made on living animals; he then gave the nervous system of the *Apus cancriformis*, which, before his time, had been but little observed. In the last place the organs of generation, in which, although he found but little to add after what had been already done, were nevertheless the object of a new examination by him. The history of the development of the insect formed the third part of the thesis. The author took, first of all, the animal as soon as it came from the egg, and traced it to the development of the first abdominal feet; he then passed to the second period, viz., the growth and development of the second pair of thoracic feet; and then at the third period, he arrived at the point of growth of the second pair of thoracic feet to the development of the external receptacle of the eggs, which formed the fourth period.

M. Audouin presented to the Academy, on the part of the author, M. Noeggerath, a similar thesis written at Bonn, dated the 5th of April 1841.—11th Oct. 1841, p. 763.

Dr. Jobert on the termination of the Nerves of the Womb.—From the researches he has made on this subject, in connection with physiological and pathological observations of this organ, he is convinced that the nerves intermingle and become confounded in penetrating the intimate tissue, or into the parenchyma of the matrix; but on submitting it to researches the most minute in anatomy, even microscopic, never could he follow the threads as far as the neck of the uterus. The whole portion of this organ which protrudes into the vagina, and contributes to form the lips of the orifice of the uterus, do not receive the slightest nervous filament; these filaments, apparently directed to that part after having become very intricate, produce a new plexus, having two kinds of

fibrillæ, according to the relation and direction they take. Many turn back, and take a direction contrary to their first course, to become distributed in the substance of the parietes of the womb, while the others descend into and penetrate the tissue even of the tube constituting the vagina. The above appearances observed in the human subject, have been also seen by Dr. Jobert in several other animals, such as the dog, rabbit, marmot, Indian hog, &c. &c.—*9th Aug. 1841, p. 336.*

Stanislas Julian on the Microscopic Examination of a Mineral Substance, called Fossil-flour by the Chinese.—This substance is made use of in China, but only in times of scarcity or famine, as an ingredient in the food of the poor in certain provinces.

The following particulars on this subject, dated the 6th of June 1839, were communicated by M. Laribe, a Chinese missionary, to M. S. Julian :—

“The earth, which M. Mathieu Ly mentioned in one of his preceding letters, is only used as food in the years of great dearth ; it is then sold from two to four *Sapèques* the pound. The specimen forwarded comes from a place situated near two first-rate towns, Lin-Kiang-fou and Fou-tcheou-fou, which have been for a long time known on account of their mineral products.

“One of our Christians who, at the period of the last famine, fed upon this earth, with five other individuals composing his family, informed me, when they made use of it, they bruised it into a very fine powder, mixing three parts with two parts of rice powder, or better the flour of wheat, to make small cakes, which were seasoned with salt or sugar.

“Recourse was only had to this means in times of great want, and this period passed, no one ever dreamed of making use of it as food. Those who were accustomed to partake of it complained of a weight at the stomach and constipation ; they could subsist for two months on these mixed materials formed into cakes, whilst, without this earth, their provisions would only suffice as food for one month. Those individuals who employed the fossil-flour without mixing with it vegetable-flour, scarcely ever escaped death.

“I should add, that this earth is only to be found in uncultivated situations, and that it appeared altogether contrary to, or at variance with vegetation.

“As certain mineral substances which have been used in the north of Europe for the same purposes as the Chinese fossil-flour, have been recently recognised as formed of the greater part of the carapaces of silicious Infusoria, it became interesting to discover if the mineral of *Kiang-li*, was not similarly composed. Accordingly, M. Peltier, at the request of M. Arago, microscopically examined a portion of this substance sent from China. But although he observed with powers which enabled him to distinguish with precision the remains of silicious Infusoria described by M. Ehrenberg in certain specimens of tripoli, and by M. Turpin in plates of silex, he has not been able to recognize in the mineral of *Kiang-li* any other trace of organization.

“Thus, says this physician, in a letter to M. Arago, announcing the

results of his researches on this subject, in supposing that the mineral-flour of the Chinese possesses nutritive properties, there is nothing to indicate that it owes them to the organic remains of animals. It is even difficult to understand how the structure requisite for nutritious substances, should be preserved in the midst of the numerous re-actions to which the remains of Infusoria have been submitted during a long period of ages. Thus, there is only to be found in the silex the silicious coverings of *Naviculæ*, *Bacillariæ*, *Gallionella*, *Gomphonema*, &c., and not organic substances. I am of opinion that the preference given by famished stomachs to certain mineral substances is more on account of their harmless property than of their nutritious quality; they distend the walls of the organ without producing lesion of the tissue, and are thus in opposition to the first effects of inanition."—*9th Aug. 1841.*

[From the *Annales des Sciences Naturelles*, 1841.]

General remarks on the tubular Vessels of Vegetables. By Charles Gaudichaud.—This memoir is one of extreme interest, inasmuch as it proves, that as far back as the year 1834, when the paper was delivered into the hands of the Editors of the "*Annales*," that M. Gaudichaud satisfactorily demonstrated the fact of there being tubular vessels in the *Cissus hydrophora* in its perfect state of growth, and that these vessels are perforated from the summit of the veins of the leaves to the extremities of the roots; that they possess the facility of uniting and grouping themselves in a variety of ways, by approach and by grafting of the tissues composing them, of communicating directly between each other, as with the other cellular and fibrous tissues, by imbibition (to make use of an expression now obsolete), or in other words, by an intercellular circulation, which may be readily explained by the phenomena of Endosmose and Exosmose; that these tubular vessels evidently serve the office of conduits to the sap-juices absorbed by the roots; that these juices, together with the solid bodies and gases they contain in solution, are modified by the tissues, and converted into an organized fluid or *Cambium*, by their contact with air and light, in the foliaceous appendages of vegetables, and probably also in all the green parts of their surfaces; facts which are already fully established by physiologists. He proceeds then to describe the experiments he has performed on a variety of plants, of Equatorial and other regions, in which he has succeeded passing, in some instance, *several hairs* (8 or 10) through the tubes of the woody structure. He has accomplished this both in Monocotyledenous and Acotyledenous plants, such as *Calamus Draco*? *C. Rotang*, *Saccharum officinarum*, *Smilax*, Palms, Ferns, and Lycopodia. Among the plants of temperate climates he has succeeded with the Oak, the Almond, Poplar, Fir, &c., notwithstanding the straight direction of the pores of these vegetables and the kind of cellular diaphragms or perforated partitions (grillages) with which they are commonly obstructed. Among others, indigenous to France, &c., including *Solanum Dulca-*

mara, *Clematis* several species, *Cobæa scandens*, *Bignonia capreolata*, *B. radicans* and *B. grandiflora*, *Eccremocarpus scaber*, *Brunniahia cirrhosa*, *Wistearia sinensis*, &c., his experiments have also succeeded; likewise on trees that have been grafted, and which do not offer any difficulty, he has numerous and very curious facts. He gives as an example, in the plate accompanying the paper, a representation of a graft of the Red and White Mulberry, showing that the hairs pass with equal facility from one wood to the other (through the grafts), as they do in the tubes of either wood taken singly.

From the preceding and other observations, M. Gaudichaud arrives at the following conclusions: — The diameter of pores (tubular vessels) in woody vegetables is generally in inverse proportion to the age of the tissues. 2. The tubular pores of Dicotyledons are more open at the circumference of stalks than at the centre, owing to the fulness of these latter; M. Dutrochet has clearly demonstrated this fact. 3. The contrary is the case in true Monocotyledons, and probably also in plants which grow by *budding*.

To this he adds, that the part called Medulla in Ferns, which appears to constitute a true tubular system, has the external pores (tubes) considerably more dilated than the internal; and thus it was only in the vessels of the outer layer of this structure, he was enabled to introduce hairs. This relationship, which is by no means so apparent between the structure of the stalks of Ferns, for example, and that of Exogens, is not the only one he has observed; some ligneous Lycopodia have likewise furnished him with more remarkable instances. These observations appertain, however, to another series of facts which M. Gaudichaud proposes treating of in a special manner in a memoir "On the Structure of Cryptogamia."

In the remainder of this paper, M. G. enters into his researches on the Comparative Anatomy and Physiology of Plants, and on the Mechanism of the Development of Stems, the abstract account of which we propose inserting in a future number.

The paper is illustrated by three figures, representing the position in which the *hairs* were passed in the stems of *Bignonia radicans*, and the graft of *Morus rubra* and *M. alba*, alluded to above.

[From *Valentin's Repertorium*, 1841.]

Lobarzewski on Circulation and Rotation in Closterium lunula.—The author observed a stream of thick clear fluid, running on the inner surface of the edge of the *lorica*, it was sometimes simple, at other times separating into numerous delicate branches, whose courses were near to each other. The current was the stronger, the nearer the streams were to the clusters of sporules or ova? At these points, the stream divided into two branches; one turned round in the opposite direction, whilst the other remained quiescent until the first again reached it, when it turned in the original direction. The motion of the original current lasted from four to seven seconds; that of the other for one second only.

Jac. Agardh has lately directed especial attention to the motion of the sporidia in green-coloured Algæ; and Desor to the rotation of the sporules of *Confervæ*.

Göppert on Fossil Plants.—According to Göppert, the destruction of the ligneous cells and vessels commences with the loosening of the secondary layer; the *pores* thereby become indistinct, and the whole cell soon after becomes destroyed, as the external membrane ceases to exist. According to the same author, *amber* has its origin from an extinct species of Pine, *Pinus succinifer*.

Link on Locomotion in the Cryptogamia.—According to Link, the *sporidial tubes* of *Limboria sticta* (Acharius) evinced a progressive animal-like motion in specimens that had been preserved thirty years.

[From *Froriep's Notizen*, 1841.]

Kolliker on Spermatic Animalcules.—1. In the seminal fluid of all animals, with but few exceptions, are to be found moving objects, the seminal filaments (so called seminal animalcules.)

2. The seminal filaments are the essential portions of the fluid.

3. These filaments are only to be found in their fully developed state in the fluid of those animals which are capable of fruitful coition, in those which procreate periodically only at the time of heat. They are not to be found in very young or old animals, nor in hybrids.

4. In order that connection should be fruitful, the fluid, that is the seminal filament, must come into direct communication with the ovulum.

5. The filaments are developed out of or in cells. *Type A*, Each filament arises from a special cell, by the increased growth of whose wall or walls it passes into an elongated or filamentous condition. *Type B*, Out of each cell formed in the testicle springs a bundle of seminal filaments. *Type C*, The seminal filaments are developed in crowds within large cells, probably in an analogous manner to the generation of the primitive muscular fibres. *Type D*, Each filament arises within a special cell. *Type E*, The filaments are formed in bundles from minute granular cells, these cells becoming dissolved, as it were, into each other, and assuming a delicate filamentous form.

6. The forms of these filaments, thus differently generated, have but a narrow differential limit, in spite of the mere variations to be observed. Almost always they are the same through the whole genus, generally so through the family and class, or at least very similar. Each species has only one form.

7. In the seminal filaments no animal organization or propagation has been satisfactorily proved.

8. The motion of the filaments is distinguished from animal locomotion by its uniformity.

9. Their motion is in immediate connection with the procreative power of the semen, &c. &c.—*July*, 1841.

In the 11th Vol. of the Nov. Act. Acad. C. L. Natur. Curios. 1839, there is a paper by G. Valentin on the Spermatozoa of the Bear, in which the question of the organization, and consequently of the truly animal nature of the seminal animalcules of this creature seems settled.—*Appendix to Willis's Wagner's Physiology.*

Wagner and others on the Capillary Vessels.—The most delicate vessels discoverable in the human body, are finer than the diameter of a blood-globule, and measure from $\frac{1}{600}$ to $\frac{1}{800}$ of a line. WEBER found the diameter of the smallest vessels in dry preparations, from $\frac{1}{300}$ to $\frac{1}{500}$ th. KRAUSE states the finest vessels of the choroid to measure $\frac{1}{801}$; of the retina $\frac{1}{540}$; of the muscular coat of the small intestines $\frac{1}{740}$; of the tibialis muscle $\frac{1}{1110}$ parts of a line. The above accord generally with the measurements given by VALENTIN and BERRES.—*Wagner über Ernährung und Absonderung.*

Wagner on the Microscopic Analysis of Chyle and Lymph.—Chyle and lymph consist, like the blood, of minute granules contained in a homogeneous fluid. The former are very similar to one form of the globules occurring in blood. They appear to consist of an aggregation of molecules formed around a nucleolus, which can be rendered apparent by acetic acid. It is by no means uncommon to observe the appearance of a case or covering around the chyle-globules, and sometimes also the transitional state of the lymph-globules into blood-globules, as the primitive circular form takes on an elongated oval one. We are therefore to look upon the lymph-globules as the free nuclei of the globules of the blood. Chyle and lymph may be easily got in sufficient quantity for microscopical examination, by pressing the cut surfaces of turgescent mesenteric or lymphatic-glands upon a plate of glass, should the quantity of fluid not be sufficient to run out of its own accord. It is true, that some blood-globules and epithelial cells of the vessels will be mixed with it; but a little practice and attention will enable the observer readily to distinguish them. Should the chyle and lymph, however, be wanted quite pure, the former must be at once obtained from the thoracic duct, and the latter from the lymphatic vessels.—*Wagner über Ernährung und Absonderung.*

[From Müller's Archives, 1841.]

Müller on a Parasitic Formation in the Pike.—In the cellular tissue of the substance of the sclerotic, and between it and the choroid, minute cysts, with very delicate parietes, containing a whitish substance composed of very minute granules, and endowed with motion, were seen; as also motionless Spermatozoa-like bodies apparently possessed of a head and tail. The tail was filamentous, like that of seminal animalcules, and in some cases bifurcated.

Müller on Diplostomum rachineum.—According to Müller, Diplosto-

um rachineum is to be found alive under the cerebral membranes of *Petromyzon fluviatilis*.—*Neurologie der Myxinoïden*.

Microscopic Observations on Milk.—M. Donné has recently communicated a memoir on this subject to the Royal Academy of Paris. A committee, consisting of M. Moreau, Professor of Midwifery to the Faculty of Medicine; M. Baron, Physician to the Foundling Hospital; and M. M. Orfila, Velpeau, Blandin, and Louis, was appointed to report upon it; and the following are the main conclusions of their report:—

1. The *colostrum* has microscopic characters which distinguish it from genuine milk. It may be recognised by *granity* (*graniteux*) corpuscles, very distinct from the globules of milk, and by a peculiar arrangement of these last-named globules, attributable to the presence of a mucous matter which connects them together.

2. In the normal state, and in healthy nurses, the milk does not exhibit any traces of colostrum, from the tenth to the twenty-fifth day after delivery.

3. We find the elements of the colostrum in the milk of certain nurses, at much more distant periods after delivery; and this character constitutes one kind of alteration of the milk, which renders it unwholesome to the infant beyond a certain age.

4. The microscope enables us to appreciate the nutritive richness of the milk by the number of the globules, which are always in proportion with the other constituents of this fluid (the caseum, sugar).

5. All the globules of milk are formed of fatty matter, as is shown by their solubility in ether; they are not composed, as it has been hitherto generally alleged, in part of butter, and in part of caseum.

6. The milk of women, as that of the cow, &c., restores the blue colour of reddened litmus paper; it is therefore not acid, as stated in most works on chemistry.

7. The milk of good healthy nurses always exhibits numerous globules, inadherent to each other, distinct, and without admixture of foreign bodies. Although there are some of all diameters, from the 500th to the 50th part of a millimetre, the greater number are of a medium size.

8. Whenever milk does not exhibit these characters, and when its globules are confused, agglomerated together by a mucous matter, and do not float about freely, and without adherence to each other on a plate of glass, or when they are mixed with foreign bodies (granular bodies or mucous globules), we must regard it as more or less abnormal and unhealthy. We observe it so in nurses who have an engorgement, or any local disease of the mammæ, and in those whose general health is disturbed.

9. The presence of pus and of blood in milk, is readily determined by microscopic examination, as well by the difference in aspect and organization of the globules which enter into the constitution of these three liquids, as by the different effects produced upon them by ammonia and ether. The globules of milk resist the action of ammonia,

while they are entirely soluble in ether : it is the very reverse with the globules of pus and of blood.—*Gazette Medicale de Paris*.

Addenda.—We observe in a recent number of the same Journal, a note on the influence of different articles of food on the milk of cows and goats. Turnips, it is said, render the milk lighter, and of more easy digestion, than the common fodder; while beet-root makes it extremely rich and substantial. The convalescence of the *Count of Paris*, the infant grandson of *Louis Philippe*, is attributed to the milk of a cow, fed on turnips, having been substituted for that of his nurse; the latter having been found to be not sufficiently nutritious. “The success was immediate and complete, the young prince being restored to perfect health.”—(*Rev.*) *Medico-Chirurg. Rev. July*, 1841.

Devergie on the Importance of a Microscopic Examination of the Milk of Wet-Nurses.—Although M. Donn  has given much insight into the structure of the milk-globule, it has remained for M. Devergie to explain further the pathological and nutritious character of the various sized globules so frequently seen and described. In his very interesting paper inserted in the *Bulletin de l'Academie Royale de Medicine de Paris*,* 30 Nov., 1841, p. 201, he arrives, after considerable experience, at the following conclusions:—1. That the globules are generally of greater dimensions in the richest than in the poorest kinds of milk. 2. That the globules augment in volume, from the period of confinement until a certain period of lactation; for example—there are more globules of the $\frac{1}{100}$ th of a millimetre at three months, than in the same milk at fifteen days. Again, M. Devergie has placed beyond all doubt the essential nutritive qualities of milk with large globules, and that by continual observations made on nurses and children; that is to say, by comparing the bulk and strength of children with the microscopic qualities afforded by the milk of the nurse, and also by comparing the milk, and general state of strength and health of the nurse.

The report made to the Academy, as given in the work above cited, is well deserving the attention of medical men and others, engaged in the selection of wet nurses, as there are arguments certainly in favour of the use of the microscope in this important branch of inquiry: thus—supposing two children are born, the one feeble and delicate, the other subject to gastro-intestinal irritation; by the assistance of the microscope, it would be easy to select a milk of greater strength for the former, and one of a weaker character for the latter.

Both Devergie and Donn  agree, that the milk-globules average from the $\frac{1}{500}$ th to the $\frac{1}{100}$ th of a millimetre in diameter; that there exist even some larger, and others smaller. Ordinary nurses have for the most part milk-globules, which average between the two extremes of measurement; their average in the cases observed by M. Devergie appears to be 61 in 100. Nurses with small globules have been found in the pro-

* On the microscopical examination of Milk, with a view to the selection of Nurses. By M. A. DEVERGIE.

portion of 22 in 100; their milk was in general poor, and incapable of acquiring richness on the return of lactation.

M. Devergie does not, however, in every case, conclude that the health of children is in direct relation with the size and numbers of these globules, but that nutrition is not affected in relation to the strength of the milk, but according to the powers of *assimilation* possessed by the infant. The whole paper is well deserving of attentive perusal.

Delens on the Milk-Globules.—According to M. Delens, the increase of the milk-globules up to a certain period, their difference of volume, and their aspect, denote a veritable organization.

It is necessary before all things, that this question of organization be determined. Chevreul, Dujardin, and Mandl, deny it to a certain extent. The different size of the globules may depend on the degree of liquidity of the serum in which they swim, or on the degree of consistency of the fatty matter of which the globules are composed, &c.

These different circumstances may give rise to little drops, as it were, of greater or less volume (the globules), swimming in the serum, &c. —*Archives Generales de Medicine*, 1841.

Gaddi on the Extreme Ramifications of the Minute Arteries and Veins in the Coats of the Intestines.—Dr. Gaddi of Modena has instituted some researches on the mode of termination of the arteries and origin of the veins in the coats of the intestines, by injecting pure water coloured with cinnabar for the arteries, and indigo for the veins, in children from two to five years of age, unaffected by any intestinal disorder.

The arteries were filled by a general injection from one of the carotids, the current being directed towards the heart; the veins from one of the mesenteric. When the injection was successful, Dr. Gaddi has constantly observed, that the trunks of the intestinal arteries were guided by the peritoneal duplicature to the external layer of the muscular coat of the intestinal tube; they turn around this tunic and penetrate it, dividing into an infinite number of anastomotic arches, more and more delicate, which traverse the second muscular coat to arrive at the sub-mucous cellular tissue. There they all terminate in a thick tuft of almost imperceptible arterioles, not one of which ever penetrates into the mucous membrane, or terminates by a free orifice. The veins, on the contrary, always arise on the free surface of the mucous membrane, by three or at least four veinules, which in most cases have a visible funnel-like orifice, and immediately after penetrating the substance of the membrane, they converge together and unite in the sub-mucous tissue, in a vesicle from which a very fine venous trunk arises, which latter soon associates with the trunk of the artery, passes with it to the muscular layers, where it divides; reunites into trunks of larger and larger size; and, lastly, leaves the intestinal walls, and passes between the folds of the peritoneum.

The tuft of very remote arterial ramusculi just described, envelopes the venous vesicle [“in a sort of atmosphere,”] so that it is there that the artery discharges itself. The vesicle is the point where the arterial takes the character of venous blood, and it is also the point which puts the two systems in communication, as Dr. Gaddi was assured in the rare cases where the arterial injection penetrated to the venous trunks, to the vesicle, to the branches, and even into the cavity of the intestines. On removing and examining with the greatest care the mucous membrane alone, he has never seen an artery nor venous vesicle, but only the venous radicles in radii. This vascular disposition is constant throughout the whole length of the intestinal tube, from the cardia to the rectum; but it offers some varieties: thus the mucous membrane of the stomach is better provided with venous radicles, especially towards the pylorus, than that of the duodenum; and they always diminish in number towards the rectum, the quantity being much less in the larger than in the small intestines.

It follows, therefore, that the generally admitted opinion of anatomists, that the arteries and veins communicate by means of an intermediate capillary system, is not correct as regards the intestines; that intestinal absorption is sufficiently explained by the capillary attraction of the venous tubes; that this anatomical disposition accounts for the rapidity with which certain substances penetrate into the circulating system, and which could not take place through the long circle of chyloferous lymphatics; and, lastly, it also explains the occurrence of hæmatemesis and malæna, which are nothing more than venous hemorrhages of the gastro-intestinal mucous membrane.—*Revue Medicale*. Juin, 1841. (*From Memoriale della Med. Contemp.*) *Dublin Medical Press*, 10th Nov. 1841, p. 295.

Ehrenberg on the Extent and Influence of Microscopic Life in South and North America.—At the sitting the Berlin Academy, 25th March 1841, M. Ehrenberg made a communication on this subject, of which the following is an abstract:—

He first referred to the fossil Infusoria sent for his examination and comparison, by Professors Silliman (father and son) in Newhaven; Hitchcock, in Massachussets; and Bailey, in West Point (New York), and which had arrived in Berlin in October 1840.

Since the discovery by Bailey, in 1838, of a similar deposit of fossil Infusoria at West Point, there had been found in Connecticut, Rhode Island, Massachussets, and Maine, not less than thirteen localities, with deposits of silicious Infusoria, sometimes fifteen feet in thickness, and of very considerable extent.

Besides these, M. Carl Ehrenberg had forwarded to Berlin numerous specimens of recent microscopic organisms, from seven localities in Mexican America, as well from the coast itself near Vera Cruz, as from an elevation of 8000 feet, near Real del Monte, San Miguel near Regla, near Atonilec el Grande, and other places; as well from stagnant waters, as from the river Moctezuma, and the sea. It had been ascertained, also, that traces of Infusoria, among copious remains of plants,

were to be met with in the volcanic mud of Quito, called Moga, so well known from the account given of it by Von Humboldt. M. Von Martius had forwarded some of the edible clay of the Amazons, the Infusoria contained in which had already been described. Dr. Montagne of Paris had also furnished the author with some Algæ, containing Infusoria, from Callao in Peru, and from Cuba.

After remarking upon the important influence these materials collected from twenty-four localities in America, would have in affording ground for arriving at more certain conclusions than could hitherto have been formed, with regard especially to the relation of these objects to climate, and to geography, and geology, he proceeded to state the following as some of the results of his examination and comparison:—

1. In South as well as North America, there occur not only living, but also fossil microscopic organisms, in thickness and extent, geologically important, and very similar in their relations to the European.

2. The American forms are for the most part similar to the European species, but there are also many peculiar species, and even genera.

3. The number of hitherto known American forms amounts to one hundred and fourteen species, of which one hundred and forty-three are common to Europe, and seventy-one, or one-third, are peculiar.

4. The greater part of these forms are silicious shielded *Bacillariæ*, but there are also soft covered *Arcellinæ*, *Microsterias*, and *Euastra*. In the sand of the river Moctezuma, there was also found dry, in great plenty, a naked *Rotifer*, (*Callidina Rediviva*); which was readily moistened, but did not revive. Calcareous Polythamia are plentiful in the sea near Vera Cruz.

5. Of the thirteen deposits of silicious Infusoria, in beds of from eight inches to fifteen feet thick, and forming tripoli and kieselguhre, are already used for many purposes. There are twelve in North America and one in Brazil.

6. Not one of the American Infusory deposits is in its elementary forms similar to that which forms the chalk-marl in the seas of the south of Europe; nevertheless, there is found in the deposit near Spencer in Massachusetts, the *Rotalia globulosa*, which is decidedly peculiar to the writing chalk.

7. The greater part of the fossil deposits in North America is found under peat banks, and belong also, by their elementary forms, clearly to the brackish, fresh-water forms of the sea-coast, although some of them lie a long way from the coast. The edible clay of the Amazons near Coari, is also a fresh-water formation.

All the deposits include some or more, under the still living, as yet unascertained species.

8. It is remarkable, that, as far as these observations extend upon the earth, the very peculiarly formed, many toothed, diadem, and saw-shaped *Eunotia*,* are met with only in the United States, and in Swe-

* In some water brought from near Sierra Leone by Dr. Stanger, among fragments of *Conserveæ* of various species, and mixed with *Naviculæ*, &c., are two species of *Eunotia*, probably the *E. diadema* and *E. serra*. Ehr.—George Busk.

den and Finland, altogether similar, and plentifully, but nowhere living. On the contrary, the *Spongia Philippensis* is observed only in Luçon and eastern North America, both in fossil deposits,—those parts differing as much in climate as the former correspond.

9. It is remarkable, further, that in the higher points of Mexico, and in the plains of northern United States, the forms approach nearer to the European than do those of the coast, at Vera Cruz and in Peru.

10. Lastly, the occurrence of Infusory mud in the fluviatile district of the Amazons, not as a low marsh, but as an extended plain, and forming an elevated and wooded geognostic stratum, calls to mind those remarkable conditions which bring the damming up of harbours and river channels into the domain of invisible, but ever actively-working organic life.

Ehrenberg's Catalogue of the above American Infusoria, &c.—The following catalogue of seventy-one species of characteristic American microscopic organisms, was communicated to the Berlin Academy, at the sitting of the 25th of March, 1841, by Ehrenberg:—

A. FOSSIL.

- | | |
|------------------------------------|-----------------------------------|
| 1. <i>AMPHIPHORA navicularis.</i> | 24. <i>Navicula costata.</i> |
| 2. <i>Cocconema Arcus.</i> | 25. ——— <i>decora.</i> |
| 3. ——— <i>Lunula.</i> | 26. ——— <i>dilatata.</i> |
| 4. <i>Eunotia amphioxys.</i> | 27. ——— <i>Gastrum.</i> |
| 5. ——— <i>biceps.</i> | 28. ——— <i>grammatostoma.</i> |
| 6. ——— <i>bidens.</i> | 29. ——— <i>Hitchcockii.</i> |
| 7. ——— <i>Monodon.</i> | 30. ——— <i>Legumen.</i> |
| 8. ——— <i>prærupta.</i> | 31. ——— <i>oblonga.</i> |
| 9. ——— <i>uncinata.</i> | 32. ——— <i>porrecta.</i> |
| 10. ——— <i>zebrina.</i> | 33. ——— <i>Pumilio.</i> |
| 11. <i>Fragillaria constricta.</i> | 34. ——— <i>Silicula.</i> |
| 12. ——— <i>pinnata.</i> | 35. ——— <i>Sillimanorum.</i> |
| 13. ——— <i>paradoxa.</i> | 36. ——— <i>tumidula.</i> |
| 14. <i>Gomphonema Americana.</i> | 37. <i>STAUROSIRA construens.</i> |
| 15. ——— <i>lanceolatum.</i> | 38. ——— <i>pinnata.</i> |
| 16. ——— <i>nasutum.</i> | 39. <i>Tabellaria amphilepta.</i> |
| 17. ——— <i>undulatum.</i> | 40. ——— <i>nodosa.</i> |
| 18. <i>Himantidium gracile.</i> | 41. ——— <i>biceps.</i> |
| 19. <i>Navicula Americana.</i> | 42. <i>Spongia ramosa.</i> |
| 20. ——— <i>amphigomphus.</i> | 43. ——— <i>serpentina.</i> |
| 21. ——— <i>amphioxys.</i> | 44. ——— <i>setosa.</i> |
| 22. ——— <i>Bacterium.</i> | 45. <i>THYLACIUM Ossiculum.</i> |
| 23. ——— <i>Baileyi.</i> | 46. ——— <i>semiorbiculare.</i> |

B. RECENT.

- | | |
|------------------------------------|------------------------------------|
| 1. <i>Achnanthes pachypus.</i> | 4. <i>Dictyocha panduriformis.</i> |
| 2. <i>Actinocyclus hexapterus.</i> | 5. ——— <i>splendens.</i> |
| 3. <i>Cocconeis oceanica.</i> | 6. <i>Echinella moniligera,</i> |

- | | |
|------------------------------------|-----------------------------------|
| 7. <i>Fragilaria Catena.</i> | 16. <i>PODOSIRA moniliformis.</i> |
| 8. ——— <i>pinnata.</i> | 17. <i>Spongia capitata.</i> |
| 9. <i>Gomphonema subtile.</i> | 18. ——— <i>Clava.</i> |
| 10. <i>Grammatophora Mexicana.</i> | 19. ——— <i>Neptuni.</i> |
| 11. <i>Navicula Campylodiscus.</i> | 20. ——— <i>obtusa.</i> |
| 12. ——— <i>bicarinata.</i> | 21. ——— <i>uncinata.</i> |
| 13. <i>Navicula crucigera.</i> | 22. <i>GLOBULUS porosus.</i> |
| 14. ——— <i>lata.</i> | 23. <i>SPIRULINA vivipara.</i> |
| 15. ——— <i>reticulata.</i> | 24. <i>Biloculina tenella.</i> |
| 25. <i>Textilaria plicata.</i> | |

The report is introduced by some observations upon the great importance of investigations into the phenomena of microscopic life ; and it is asserted, that these labours should be regarded in a different light from those embracing the systematic or anatomical description of other natural bodies.

The important relation that the subject bears, not only to geological researches, but to development of many and more important planetary conditions, is considered by the author to entitle it to rank with the observations and experiments upon magnetic and electrical forces.

Bibliographical Notices.

A Manual of the British Algæ; containing Generic and Specific descriptions of all the known British Species of Sea-weeds, and of Confervæ, both Marine and Fresh-water. By the Hon. William Henry Harvey. London: John Van Voorst, 3, Paternoster Row. 1841. Svo. pp. 287, including the Introduction.

THIS work has at length supplied a valuable desideratum to British Algologists, and Cryptogamists generally, as it at once places in their possession, in one volume, a description of every hitherto discovered species of Alga, which has been found and recorded as inhabiting the shores, rivers, &c. of our "sea-girt isle."

The author's acquaintance with the late views of Ehrenberg concerning the nature and position in the scale of organization of certain genera of the family *Diatomaceæ*, we consider must be very limited, as in the Introduction, which occupies 68 pages, and is deserving of attentive perusal, allusion is only made to this observer once (p. 8), when speaking of some of them being covered with *organized silex*, (organised!)—here the reader is referred to a foot note, "See Ehrenberg's Recent Discoveries,"—but such a reference does not however in any way intimate the opinion entertained by this learned observer, as to the *animal* nature of some *ten* genera, which Mr. Harvey, following the steps of Dr. Greville, has included as *vegetable*, without any remarks as to what has been done within the last few years on this, one of the acknowledged limits of the two kingdoms of nature. This, however, only holds good with regard to some ten or twelve genera,

and these necessarily the last in the work. Mr. Harvey, we must maintain, has, as good a right to adhere to his opinion on this point as M. Ehrenberg; but at the same time it would have given us pleasure to find the interesting observations given by Ehrenberg, for classing them with the Infusoria, even quoted in abstract.

The work is got up with great care, and forms a necessary adjunct to complete the valuable series of works on British Botany, for several years in the course of publication.

Flora Sacra: or the knowledge of the Works of Nature conducive to the knowledge of the God of Nature. By the Rev. C. A. Johns, B.D., F.L.S., &c. London: Parker, pp. 47, 1840.

Of the twenty-three specimens of mosses which the author has selected to illustrate the various quotations from Scripture which are appended to each, there is but *one*, we think, that bears directly upon the title, viz. *Gymnostomum fasciculare*, supposed by Hasselquist, from its being the smallest found in Syria, to be the *Hyssop of Solomon*. The work possesses no scientific recommendations, and is only interesting as affording an additional apology for introducing to the attention of the fair sex (in an expensive form) actual specimens of British mosses.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

January 26th, 1842.—Richard Owen, Esq., F.R.S., President, in the Chair.

DR. EDWIN LANCASTER was elected a member.

A paper was read by Mr. John Quekett, "On the presence in the Northern Seas of Infusorial Animals, analogous to those occurring in a fossil state at Richmond, in America." After alluding to the great discoveries of Professor Ehrenberg in this department of science, the author proceeded to mention a stratum of animalcules twenty feet thick, recently detected by Professor Rogers, underlying the city of Richmond, in Virginia. It contains remarkable specimens of *Navicula Actinocykli*, *Gallionella*, &c., &c.; but the most extraordinary form is a circular disc, with markings very similar to those on the engine-turned back of a watch. On examining the sandy matter which had been washed from some Zoophytes brought home by the Northern Expedition under Capt. Parry, in 1822, the author has detected more than six animalcules in it, precisely analogous to those occurring as fossils in the Richmond Sand, and amongst these the circular disc above described. These last occur in the fossil state, singly, very rarely in pairs, and some doubts have arisen as to what they really were; but from the investigations of the author, they are found to be a species of bivalve, and many may be seen enclosing animal matter between their valves. Other bivalves fully as large as these, are to be seen without markings

on their surfaces; and some very minute specimens were attached to portions of sea-weed, by a small stem or pedicle. The paper was accompanied with diagrams, and with the animalcules, both recent and fossil, for examination.

The President announced as an addition to the cabinet of objects, a present of twenty-four beautifully injected preparations, from Professor Hyrtl, of Prague, Bohemia.

Microscopical Memoranda.

The Agency of Animalcules in the Formation of Limestone.—At a meeting of the Ashmolean Society on the 2nd March 1841, Dr. Buckland read a paper on this subject. He commenced with exhibiting specimens of Stonesfield slate and Derbyshire limestone, in which microscopic shells have been discovered in great abundance, and then proceeded to discuss the question, how far the frequent occurrence of such remains in the carboniferous and oolitic limestones, as well as in the chalk and tertiary formations, justifies the revival of the old, but exploded vermicular theory—"omnis calx e vermibus, omnis silex e vermibus, omne ferrum e vermibus." He then exhibited the plates of Ehrenberg's work on the animalcular constitution of chalk (1839), in which specimens from twelve very different localities are figured, all of which are crowded with Foraminiferous and other minute chambered shells, varying from $\frac{1}{24}$ th to $\frac{1}{200}$ th of a line. The specimens from the north of Europe contain a greater quantity of inorganic earthy chalk, than of organic substances, whilst those from the south of Europe exhibit a larger proportion of animal remains. The chalk from the south of Europe contains abundant silicious Infusoria, but no flints; whilst that from the north of Europe is full of flinty nodules, but has no silicious Infusoria, excepting within the nodules themselves, as if they had been attracted to the nascent nodules from the fluid in which they were floating. Dr. Buckland, admitting with Prof. Ehrenberg and Mr. Bowerbank, who has discovered what he conceives to be parasitic sponges in the black substance of chalk flints, that animal remains have contributed much to the substance both of chalk and flint, felt disposed to refer the earthy portions of the chalk and the inorganic substance of the flint, to segregation from the water, in which both the lime and the flint were held in solution. He then pointed out the relation of the recent Nautilus and the Sepia to the minute molluscos constructors of recent as well as of fossil Foraminiferous microscopic shells, and showed how much had been added to the amount of animal remains known to have contributed to the formation of limestone, by the modern discoveries of microscopic shells and Infusoria. He illustrated the extent to which molluscos animals occur in our present seas, by Captain Beaver's discovery, that two shoals between the Cape of Good Hope and the Island of Mauritius, marked in the charts as sand-banks, are masses of Medusæ, floating 150 fathoms beneath the sea, and by Captain Scoresby's calculation of the enormous number of Medusæ in the water of the Greenland

Seas. Dr. Buckland then alluded to the microscopic animalcules that fill stagnant ditches and pools of fresh water, and which frequently give a green or red colour to the water; and to the fact of the sediments of fresh-water lakes, such as Neufchatel, being composed of Infusoria. These Infusoria frequently, when the mud becomes dry in summer, are taken up by the wind and carried about in the atmosphere, till they fall again into water, or some other fluid, and are resuscitated. The general presence of these desiccated Infusoria in dry ponds, accounts for a stratum of polishing stone found near Berlin, composed entirely of silicious shells, or shields of Infusoria. Recent discoveries of marine Infusoria in sea-water, lead us to infer that such animalcules most probably abounded in the ancient seas, and that the application of the microscope to silicious and calcareous sedimentary rocks, will disclose the presence of marine and fresh-water remains, and thus introduce a new era in palæontology, by demonstrating the very extensive, though not exclusive agency of animalcules in the formation of limestone. In the case of crystallized marble, it is not improbable that intense heat has obliterated all trace of organic remains, if they ever existed.—*Athenæum*, 1841.

On the Yeast of Beer.—In the development of *Torula Cerevisiæ* (Beer-ferment) by the time that five or six vesicles are found in each group, the fermentation is sufficiently advanced for the purposes of the manufacturer, and he then takes means to check it. The vegetation of the yeast is then suspended, and the groups of vesicles separate into individuals, the mass of which constitutes the yeast thus largely increased in amount. This discovery was made almost concurrently by three observers, M. M. Cagniard Latour, Schwann, and Kützing.—*Brit. and For. Med. Rev. April 1840, p. 579.*

*On the Figured Stones of Egypt.**—New and successful microscopic observations on the figured stones of Egypt, have enabled Ehrenberg to ascertain that these configurations, resembling the corpuscles of Kaolin and chalk, but in gigantic proportions, have in all probability been produced by the same agents as the corpuscles of the latter, only with grosser materials. In fact, we immediately recognise in these Egyptian formations, whether they be in rings, discs, or spheres, and varying in size from an inch to a foot, the animals of the chalk (for example, *Textillaria globulosa*) whose undissolved calcareous coverings have been subjected, in the progress of their formation, to a force which has disposed them in annular series. These are appearances altogether different from those presented by the flints and jaspers of Egypt, in which we meet with imbedded *Polythalamia* only here and there. The latter are not the corpuscles themselves, but only their form silicified by a chemical operation, the nature of which is unknown to us. The small visible calcareous coverings obtained by acids in the soluble layers

* The title of the paper from which this note is extracted, is, "On the Forms assumed by Uncrystallized Mineral Substances, such as the Ocellated Stones of Dendera in Upper Egypt, and the Stones of Imatra," &c. By M. EHRENBURG.

of the figured Egyptian stones, shows distinctly that the operation to which they owe their present condition did not consist of a composition and substitution, and that it was not of a chemical nature; that it did not take place slowly, and in a continuous manner, but that it was the calm and tranquil result of a mechanical decomposition. It may easily happen, that we may accidentally notice, in a chemical operation, certain identical parts which have undergone no change, notwithstanding the alteration of the principal mass, just as we find unaltered flour in the dough of bread, chalk in silex, or foreign substances imbedded in crystals; but heterogeneous portions, arranged in a series of regular formation, present a character peculiar to the configurations in question, in which are formed, in a manner altogether remarkable and different from what is usually observed, and under the influence of a particular force, lapideous rings, free, concentric, and unconnected with each other; between which, alternate layers of lime, with the animalcules of the chalk are deposited, giving rise to forms having a solid nucleus with a free but solid ring, suggesting to the fancy the figure of Saturn and his ring.—*Jameson's Edinb. New Phil. Journ. Vol. 30, p. 354, 1841.*

The Acarus of the Boa Constrictor.—(Mr. J. H. Fennel ?) has described, and rudely figured, in No. 1085 of the Mirror, a new species of *Acarus* (*Ixodes* ?) met with adhering to the only part of the *Boa Constrictor*, from which it could draw its nourishment with ease. The following description is given of this insect:—"The form of its body is rounded, without any distinction between the thorax and abdomen, which are united: its upper or dorsal surface presents a black transparent ground, covered with circular black rings round the margin; in the centre it presents a transparent surface of pale emerald green, having also black rings dispersed over its surface, of various sizes, which give it a beautiful appearance. The head projects from the anterior part of the body in the form of a protruded sucker, with the antennæ projecting from each side of it. Two minute simple eyes may also be seen on the head; legs four." It is named *Acarus pictus*, from the beautiful colours it presents.

Fossil Foraminifera in the Greensand of New Jersey.—Prof. J. W. Bailey, in a recent visit to the cretaceous formations of New Jersey, has brought to light the interesting fact, that a large portion of the calcareous rock defined by Prof. H. D. Rogers as a third formation of the upper secondary, is made up, at the localities where he examined it, of great quantities of microscopic shells, belonging to the Foraminifera of D'Orbigny, which order includes those multilocular shells composing a large part of the calcareous sands, &c. of Grignon and other localities in the tertiary deposits of Europe. Since the minute multilocular shells above alluded to were discovered, Dr. Torrey and Prof. Bailey have together examined specimens of limestone from Claiborne, Alabama, and have found in them Foraminifera, of forms apparently identical with those occurring in New Jersey. None of this order, except the genus *Nummulites*, have heretofore been noticed in our greensand formations.—*Silliman's Journal, July 1841.*

Application of the Solar and Oxy-hydrogen Microscope to Minute Anatomy.—M. Donné of Paris has recently addressed the Royal Academy on the applications which he has made of the Solar and Oxy-hydrogen Microscopes, for the purpose of demonstrating the minute anatomy of the different elements of animal and vegetable structures, the composition of their various juices and fluids, the circulation of the blood and sap, the molecular arrangement of the nervous and muscular tissues, the development of pathological changes, &c.—*Medico-Chirurg. Rev.*, July 1841.

[This was most certainly accomplished by the late Dr. Todd of Brighton, some few years since, who obtained a field of view about four feet in diameter. The instrument was made by Mr. Cary of the Strand, under the directions of Mr. J. T. Cooper, and is, we believe, now offered for sale.—*Editor.*]

On the Existence of Fibrine in the Blood in the shape of Globules.—Since the time of Hewson, it has been the commonly received opinion, that fibrine exists in a state of solution in the serum of the blood. He arrived at this conclusion from observing, that, when a buffy coat was forming on the surface of recently drawn blood, the clear serous-looking fluid collected from its surface with a spoon separated into serum and a fibrinous clot. Subsequent observers having remarked the same fact, arrived at the same conclusion; and it is not a little strange, that, whilst other portions of the blood have been frequently subjected to microscopical examination, this portion, (viz., serous-looking fluid collected from the surface of recently drawn blood, and which forms the buffy coat) has been passed over unnoticed—a few observers have, it is true, observed colourless globules in the mass of the blood, mixed with the coloured globules; but their true nature has never been hinted at.

Mr. Addison on placing in the focus of a microscope a drop of the serous fluid which collects on the surface of the clot, found it to consist of serous fluid, and “an immense multitude of clear colourless globules.” Some of the same serous fluid, removed from the surface of the recent blood, before coagulation had taken place, separated into serum and a clot of fibrine. This experiment was frequently repeated and always with the same result.

It is astonishing that analogy did not lead physiologists, or anatomists long ago to this very result; for, on examining any portion of fibrine with the microscope, each fibrilla is always found to present the appearance of a congeries or string of globules. This discovery will also explain many circumstances connected with the physiology of the blood, hitherto not properly accounted for. It will go far to explain the appearance of the buffy coat on blood drawn from a vein, as the different specific gravities of the fibrinous and red globules, in particular conditions of the blood, may account for the greater or lesser thickness of the fibrinous layer on the surface.—*Mr. Addison in Lond. Med. Gaz.*, 1840.

V.—ON THE STRUCTURE OF HAIRS AND OTHER CUTICULAR APPENDAGES
IN VARIOUS CLASSES OF ANIMALS.—No. I.

*By George Busk, Esq., Surgeon to the Hospital Ship,
Dreadnought, &c.*

It is proposed, in a future number of the *Microscopic Journal*, to give an account of observations upon the structure and growth of hairs, &c. in various classes of animals, sufficient materials for this purpose not having, at present, been collected. In the mean while, however, it is intended to give figures, with short descriptive accounts of each, in successive numbers of the *Journal*, until enough shall have been procured to allow of the subject being properly embraced as a whole; under which will be included, besides hairs, strictly so called, other analogous cuticular appendages, as feathers, horns, &c.

In the present number are given representations of wool, the hair of the mouse, and of the sable.

Different kinds of Wool magnified about 155 diameters.

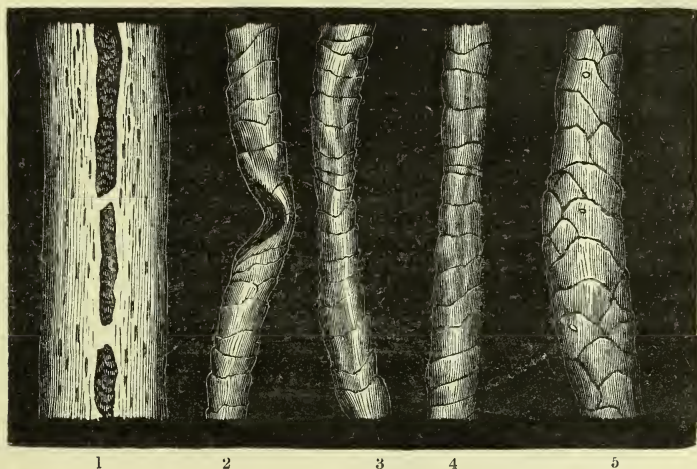


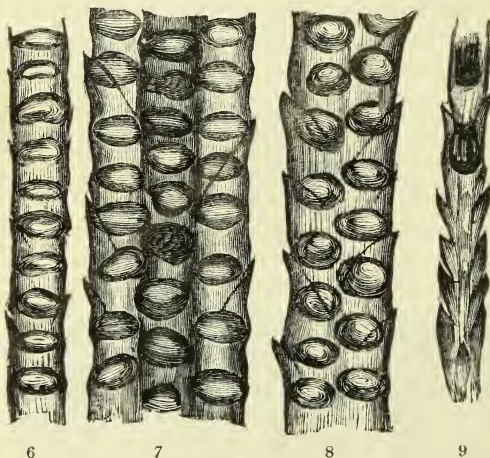
Fig. 1. Coarse long wool: dyed green, and rendered transparent by Canada Balsam; shewing a small central canal, partially filled with colouring matter, and a thick cortical part of simple fibrous structure.

Figs. 2 and 3. Fine Saxony wool: very compressible and flexible, of varying diameter and irregular form, without apparent *internal* hollow;

external surface composed of irregular scales. No. 2 shews the compressibility of the hair at an angular bending.

Figs. 4 and 5, are fine English wool: presenting the same characters of irregular diameter and form, in less marked degree; in Fig. 5, the scales on the outer surface are strongly marked, and some of them have small irregular spots, probably remains of nuclei of the cells from which the scales have been formed.

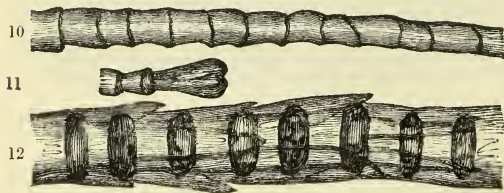
Hairs of the Mouse magnified 310 diameters, and representing portions of various degrees of thickness.



These may be considered in some degree as a type of the hairs of rodents generally. The form of the hairs is not shewn in these figures, but they are circular, or slightly compressed, and tapering towards each extremity, and usually thicker towards the point. *Internally* tubular, and furnished

with cells of nearly uniform size, containing black colouring matter. In the thicker hairs these cells are arranged alternately in two, three, or more rows, and they are lost towards both extremities. The *external* surface is composed of regular, imbricated, adpressed, somewhat rounded scales.

Hairs of the Sable, magnified 620 diameters.



These may be considered typical of the finer hair or down of the weasel tribe, which at first sight much resembles that of rodents; from which,

however, the larger hairs will be found to differ more materially.

These hairs are compressed, tapering to each extremity, but thicker

towards the base. *Internally*, hollow, and furnished with colour cells, which will afterwards be referred to. *Externally*, covered with elongated, imbricated scales, not very closely adpressed. Towards the point for some distance the colour cells disappear, and the scales assume a very different form. The point usually appears broken off, as in Fig. 11.

VI.— ON FOSSIL XANTHIDIA.*

By Henry Hoply White, Esq.

THIS interesting portion of fossil Infusoria called Xanthidia, in the recent state forming a genus of the tenth family of the class Polygastrica, called Bacillaria, has, in this genus, the animalcule unattached and free from any pedicel, of a globular form, generally spherical, but in some of the species occasionally of an irregular oval. With one exception, all the species of this genus have the lorica or external covering semi-transparent, and invested with tentacula, which vary in form, number, and dimensions. From these tentacula Mr. White observed, that each of the different species might be discovered without much difficulty. The name Xanthidium is derived from the Greek word *ξανθος*, yellow, the prevailing hue of these animalcules. He comprehended under this genus the species which he named *X. globosum*, because it has merely a globular form, without any tentacula or spines; it is generally opaque, though slightly transparent round the verge of the circumference, and without any apparent aperture, but some varieties are as transparent as the other species of Xanthidia: it is generally found among the other Xanthidia, and like them, orbicular in form and of a yellowish colour, and the only animalcule which he could discover, besides the eleven other species, which has a well-defined spherical lorica or covering. Assuming this species to form one of the genus Xanthidium, he found that all the other Xanthidia he had examined (comprising many thousands of individuals from flint† out of many chalk districts in England), could be distinctly and satisfactorily arranged under eleven species, exclusive of that called *globosum*, thus making twelve in all. There were individuals, occasionally found, deviating in some measure from those which he proposed to submit to the Society; but their deviation of form was to be attributed to accidental circumstances, to imperfect or distorted structure. The classification

* Abstract of a paper read before the Microscopical Society of London, on the 16th February, 1842.

† They are also found in gravel flint.

hitherto recorded he considered imperfect, and the want of a nomenclature to characterise those, which in his continued observations were so constantly recurring, induced him, for his own convenience, to adopt the arrangement of the different species under the nomenclature suggested. Taking the *X. globosum* as the simplest in form, he placed it as the first, and the other eleven species he arranged in order as they gradually became more complex in the structure of their tentacula.

First, the *Xanthidium globosum* has, as before observed, merely a spherical body without tentacula, spines, aperture, or other variation of surface. It varies in dimensions from the $\frac{1}{500}$ th to $\frac{1}{34}$ th of an inch; the author imagined, that it sometimes appeared filled with minute globules or molcules.

The *second* is the *Xanthidium vestitum*, which is so named from the thin transparent membrane which extends beyond the body to the extremity of the tentacula, and by which the animalcule appears to be surrounded; the author was of opinion that this appearance results from a gelatinous substance in which the animalcule is enveloped; and that the deviations from a perfectly spherical form indicate different stages of the condition of the animalcule, and that in several specimens in his collection, part of the animalcule is quite free from the surrounding mass, and the tentacula (which are almost always those of the species *ramosum*, afterwards noticed), denuded of the substance with which the other parts continued to be incumbered. Sometimes the membrane seems to adhere to two or three tentacula separately, and at other times to one only. This species measures in diameter from the $\frac{1}{400}$ th to $\frac{1}{280}$ th of an inch.

The *third* species he called *Xanthidium fimbriatum* or fringed, from the short processes or stunted tentacula which densely surround the body. He considered it impossible in this and in the other species to arrive at more than an approximation to the number of tentacula which covered the entire surface of the bodies of these globular animalcules; so that he had not attempted to make the *number* of the tentacula a specific characteristic. The *X. fimbriatum* measures in diameter from the $\frac{1}{500}$ th to the $\frac{1}{330}$ th of an inch.

The *fourth* he called *Xanthidium hirsutum*, the name which had been given to it by former observers. It is so called from the hairy or furred appearance which the numerous thin tentacula assume, being in tufts, less uniform and regular in their arrangement than the next species noticed. It is not so perfectly spherical as most of the other species; indeed, the uneven tufted or matted appearance of the tentacula, like hair or fur, completely obscures the contour of the body on which they

are placed. It varies much in its dimensions, differing from $\frac{1}{500}$ th to $\frac{1}{285}$ th of an inch.

The *fifth* in order was the *Xanthidium furcatum*, or forked Xanthidium; a name previously applied to one species by former observers. It differs from the *X. hirsutum*, or hairy Xanthidium, in the circumstance, that the tentacula are far less numerous, more separated, more regularly arranged, and divergent from the common centre of the animalcule. The tentacula are slender, and gradually tapering to the extremity; and those apparent round the circumference are from 30 to 40 in number, and even more; the average diameter is from $\frac{1}{500}$ th to $\frac{1}{330}$ th of an inch.

The *sixth* is the *Xanthidium spinosum*, which is so called from the singularly long tapering tentacula, which characterise this species. The individuals vary in dimensions, but upon the whole, measuring in diameter from the extremities of the tentacula, they are the largest of the species of Xanthidia, except the *X. tubiferum* afterwards noticed; the tentacula apparent round the circumference are from 15 to 25, and they measure in diameter from the $\frac{1}{500}$ th to $\frac{1}{250}$ th of an inch.

The *seventh* he named the *Xanthidium malleoferum*, or hammer-bearing, from the latin malleus, a hammer, and fero, to bear. The tentacula of this species are for the most part terminated by a small process or arm, placed in many instances at right angles, at the extremity of each tentaculum, which nearly bisects the little arm, and which thus forms the head of the hammer in two equal parts. There is a variety in this species, in which the two cross arms do not, as in the preceding instance, form a straight line at right angles with the tentaculum, but diverge from its extremity at a very obtuse angle. The apparent tentacula vary in number from 15 to 50, and in length, some being very short and thickly set round the circumference, others longer and more scanty, and approximating to one variety of *X. ramosum* next noticed, having but two instead of three points or processes at the end of the tentacula. The general form of the body also varies, sometimes being spherical, at others elliptical. The average size measures in diameter from $\frac{1}{400}$ th to $\frac{1}{90}$ th of an inch.

The *eighth* is the *Xanthidium ramosum*, or branched Xanthidium. It is the most common of all the twelve species: there are several varieties. The tentacula round the apparent circumference vary in number from 15 to 30; the average number is about 20. The characteristic of this species is the branching termination of the tentacula. These branching terminations to each tentaculum are generally three in number, diverging from the end like a bird's foot, only longer in proportion, and

more tapering; but sometimes these branching terminations are of more complex structure, each of the three arms branching out again at their extremities into further processes, resembling the more complicated form of another species, afterwards noticed as the eleventh. The average diameter measures from $\frac{1}{400}$ th to $\frac{1}{330}$ th of an inch. He noticed a very remarkable one in his collection, and the only one discovered among some hundreds. The body is transparent, and within it are three red globules, most clearly apparent, of an irregular oval or oblate form, composed as it would seem of a cluster of minute molecules.

The *ninth* species is the *Xanthidium crassipes*, or thick-legged; the name which had been given to it by former observers; Mr. White observed, that whenever he could he had adhered to the nomenclature adopted in a paper furnished by the Rev. J. B. Reade, in Taylor's Annals of Natural History. The tentacula of this species are very irregular in form and number, generally about eleven are apparent, varying in thickness and in arrangement, and not in these particulars reducible to any established order. Out of these eleven tentacula apparent round the circumference, three or four, sometimes even five, are very thick; the remaining six or seven are more or less slender, and generally tapering to a point, and some are longer than others. The outer margins of the thick tentacula are very irregular in form, generally indented or waved: this thickness would seem to be formed by a membrane spread over and connecting two or three of the smaller tentacula; which smaller tentacula, so far as his observations extended, were not branched like *X. ramosum*, but simple like *X. furcatum*. The average diameter of the *X. crassipes* is from $\frac{1}{280}$ th to $\frac{1}{250}$ th of an inch. Some, however, were occasionally found much larger.

The *tenth* species, is the *first* of the last three species, which he called *Xanthidia tubifera*, two out of which had been previously so named by other observers. All three species resemble each other in the circumstance, that the tentacula have distinctly the appearance of tubes, being more transparent, and with the exception of the *X. crassipes*, much thicker than those of the other species of Xanthidia; it therefore became necessary to give them an additional designation, to mark the specific distinction of these three last species from each other. The *first* of the three tubifera, or tube-bearing Xanthidia, he therefore called *Xanthidium tubiferum simplex*, or, leaving out the generic name, the *Tubiferum simplex*; because the tubiform tentacula have a simple termination, that, being a plain circular orifice, slightly curving outwards like the end of a trumpet or hautboy; perhaps, not unlike the mouth

of a leech when fixed, and in the act of drawing blood. This he found by far the most rare species, having discovered two or three only during his researches, among thousands of the remaining species. They have about fifteen tentacula apparent, and measure in diameter about $\frac{1}{250}$ th of an inch. These *X. tubifera* from their peculiar structure and substantial appearance, more than any of the other species, clearly prove that these animalcules are spherical, and armed, in all parts of the body, with tentacula.

The *eleventh* species of the genus Xanthidium, and second of the Tubifera, is the *Tubiferum complex*; which differs from the last in this, that the tubiform tentacula have branching terminations or processes, but which are not uniform in their structure, there being two varieties, at least, of this species. Sometimes the orifice is separated into unequal divisions, of four, five, and six parts, in others like one variety of the *X. ramosum* before noticed; the branching terminations being of a more complex structure, each branch having at its extremes a further ramification; which last he is strongly inclined to consider not a variety of the species, but the same as the former, in a more advanced state of development; and from specimens in his collection, Mr. White was of opinion, that these terminations of the tentacula do not uniformly progress towards perfect form, but that some attain to perfect development before others.* The average diameter is from $\frac{1}{300}$ th to $\frac{1}{100}$ th of an inch. This is the most common of all the Tubifera; but all the Tubifera are rare compared with the other nine species.

The *twelfth* and last species of the genus Xanthidium, and the third of the Tubifera, he named the *Tubiferum recurvatum* or *palmaforme*—the curved or palm-formed Tubiferum. It differs from the two preceding in having the tentacula decorated at their terminations with a cluster of smaller curved processes, diverging from the orifice of each tentaculum, and inclining backwards in the form of a cluster of palm leaves, from five to six in number, and probably more. Next to the *X. tubiferum simplex*, this is the most rare species; the average of their diameter, measuring as before from the extremes of the opposite tentacula, is from $\frac{1}{330}$ th to $\frac{1}{280}$ th of an inch. Here Mr. White observed, that the recent Xanthidia discovered alive in water sent by Professor Bailey from a pool at West Point in North America, resembled closely the fossil species of the Tubifera, in the tubiform character of the tentacula;

* Some individuals exhibiting all these varieties in the terminations of their tentacula.

but in reference to the terminations of these tentacula (being trifid), they most resembled one variety of the species of *X. ramosum*. The apparent tentacula of the recent Xanthidia did not exceed fourteen in number, measuring, in extreme diameter, $\frac{1}{250}$ th of an inch. He informed the Society, that he had the gratification of seeing one of these recent specimens move its tentacula, which for a time he preserved in its collapsed state. He observed, that the discovery of these recent specimens proved beyond all doubt, that the various fossil species are animal, and not vegetable substances; and, judging merely from the appearance of these fossil species, we might conclude that they were in existence at the moment, when by some wonderful agency, they and the surrounding fluid, in which they were living, became converted into one solid mass of silex, assuming their present form of nodules of flint; and after offering some remarks on the formations of these flint nodules, he said that it could not fail to arrest attention, that, delicate as is the structure of these minutissimal creatures, there is not, in by far the greatest proportion of them, any appearance of distortion, pressure, or injury of any kind; they seem to have been suddenly arrested in the full enjoyment of life, developing (as far as form and perfect structure can evidence the fact) every indication of animation exhibited by the recent species up to the very moment of their transformation from the living to the fossil animalcule. He then concluded his discussion of this interesting subject as follows:—“But whatever be the mode or agency by which the changes were effected in those conditions of the earth’s surface which characterize the Cretaceous Period, we have, in these flints, records of animal existence, as convincing and irrefragable, as in those more gigantic memorials of the earth’s inhabitants in former epochs of its dark history, whether in the form of the Ichthyosauri, the Iguanodon, or the fossil remains of beings of still more remote antiquity. We have in every section of a flint-nodule, proofs, that in the former periods of the surface of our planet, the lines of the poet were then, in part at least, as applicable as now, when he says,

“See through this air, this ocean, and this earth,
All matter quick, and bursting into birth.”

Explanation of Plate IV, Division 3.

Fig. 1. *X. globosum*.—2. *X. vestitum*.—3. *X. fimbriatum*.—4. *X. hirsutum*.—5. *X. furcatum*.—6. *X. spinosum*.—7. *X. malleoferum*.—8. *X. ramosum*.—9. *X. crassipes*.—10. *X. tubiferum simplex*.—11. *X. tubiferum complex*.—12. *X. tubiferum palmatum*.—13. Nos. 8, and 11, as seen through a Coddington lens, whose radius of curvature is $\frac{1}{4}$ of an inch, magnifying about forty diameters.—14. Variety of *X. ramosum*.—15. Recent Xanthidium from West Point, United States.

VII.—ON THE HAIR-COLLECTORS OF CAMPANULA, AND THE MODE OF FECUNDATION OF THESE PLANTS.*

By M. Adolphe Brogniart.

It has been long known, that the external surface of the superior part of the style and stigmatic branches of *Campanula*, are covered with long hairs, very apparent in the flower bud before the emission of the pollen, and in which the regular arrangement of longitudinal lines in relation to the number and position of the anthers, has attracted the attention of observers.

These hairs, and the relation they bear to the pollen, were first observed by Conrad Sprengel, in several species of *Campanula*, since by Cassini, with much care, in the *Campanula rotundifolia*, and have been found in all plants of the family of *Campanulaceæ*, with the exception of the small genus *Petromarula* of M. A. De Candolle. At the moment of the dehiscence of the anthers, before the expansion of the corolla, and while the branches of the style are yet in contact one with another in the form of a cylinder, these hairs are covered with a large quantity of pollen, which they sweep, thus to speak, from the cells of the anthers; and on this account they have been termed, like their analogues in the family of *Compositæ*, *hair collectors*.

At the period of the expansion of the corolla, the branches of the style or the stigma disperse and bend; the anthers which surround them are removed and wither, after having lost all their pollen; but at the same time the pollen, deposited on the exterior of the style, is detached, and the hairs which covered the surface disappear.

Cassini likewise asserts, that these hairs are caducous, and that they disappear at the same moment as the pollen which they hold; there being found, according to this author, no other traces on the style than small asperities.

M. A. De Candolle is still more explicit. He expresses himself thus:—"the branches of the style begin to diverge; at the same time the pollen disappears, the hair collectors fall off, and the style becomes quite glabrous."

The microscopic examination of these hair-collectors has convinced me that they do not fall; but that they present a phenomenon which has not as yet its parallel in the vegetable kingdom.

* From the *Annales des Sciences Naturelles*, Vol. xii. p. 244.

When a thin longitudinal section of the style is examined previous to the escape of the pollen from the cells of the anther, it is seen that these cylindrical hairs, slightly attenuated at their free extremities, are formed by an external prolongation of the cuticle, and that they are perfectly simple, without any trace of joint or chamber, even at their base.

Immediately beneath each of these hairs exists a subjacent cellular tissue, a cavity equal in depth to the half or third of the length of the hair, continuous with it, and which appears to be filled with the same fluid. This cavity, with the others, is not prolonged beyond the most superficial layer of the style or stigma, and has no relation with the deeper tissues, of which I shall presently speak.

This arrangement persists until the period for the expansion of the flower, the hairs being then covered with the grains of pollen applied on their surfaces, and retained in their interstices.

But at this period the hairs enter the cavities at their base in the cellular tissue ; the terminal half of them is withdrawn into the half situated at the base of the hair, at the time that this enters its cavity. The summit of the hair which has been withdrawn, makes a slight projection above the external surface of the style, and produces the small asperities noticed by Cassini. Sometimes the hair, on thus being withdrawn into itself (invaginated) carries with it some grains of pollen, which appear to penetrate into the tissue of the style, but which are always in relation with the external surface of the hair. With a little care, and by means of a needle, these hairs thus withdrawn in the tissue of the style may be extracted ; and in this case the grains of pollen which appear to have penetrated into the interior, are immediately expelled. The pollen grains undergo no change during the time they are in contact with the hair collectors, nor when they are taken in by them in their act of retraction.

Thus no communication is established between them and the interior of the style.

As for the immediate cause of this motion of retraction of these hairs, without pretending to give a decided explanation, I think it may be attributed to the absorption of the liquid contained both in the hair and the cavity at its base, and which absorption would cause the hair to be brought back into the cavity : no other means is visible, which, by its action, can account for this phenomenon.

The examination of the structure of this external zone of the style and stigmatic branches, already tends to prove the slight weight of the opinion of physiologists, who believe, that fecundation is performed by

the action of the pollen on these parts; an opinion undoubtedly promulgated by Cassini and A. De Candolle, and most positively denied by Treviranus, who, in his *Physiology* (Vol. ii. p. 343), considers the internal stigmatic surface as formed of papillæ, analogous to those which sometimes terminate petals, whilst, according to him, the hairs which cover the external surface of the style and stigmata, perform the functions of true stigmata. Link (*Philos. Bot. Rd. Alt.* Vol. ii. p. 222) also admits that fecundation is performed by these hairs, the summits of which become destroyed, and the base then presents, according to him, a large opening prolonged into the style.

On dissecting the true stigmata of *Campanula*, that is to say, the internal surface of the stigmatic branches, previous to their diverging, the grains of pollen which are found adherent to that surface, adhere to it as in all true stigmata, at first by the presence of the moisture which lubricates them, and afterwards by the development and penetration of the pollen tubes, which soon extend into an elongated and soft vessel of reticular tissue, which occupies the centre of the style.

This vessel of conducting tissue, of an hexagonal form in the true *Campanula*, in which the stigma is triply branched, is perfectly distinct from the surrounding tissue, and is more dense and coloured; it is easily separated, and is entirely composed of cylindrical cells (utricles) or slightly tapering and very long, colourless, completely free, joined laterally one at the extremity of the other, containing very small regular globules of starch, (coloured blue by iodine). The pollen tubes which pass between the cells (utricles) of this tissue, are readily distinguished by their great thinness, the absence of joints, and the very fine and scarcely distinct granules which they enclose.

VIII.—DESCRIPTION OF A NEW COMPRESSOR.*

By George Yeates, Esq., of Dublin.

THIS instrument is intended to obviate the objections to one originally used by M. Bergin for crushing or compressing minute portions of water or insects, during observations under the microscope. It possesses, in my opinion, the following advantages:—

From its parallel motion it diffuses the fluid more uniformly than those hitherto used:

It affords greater facility in placing an object for examination under the microscope, or in removing it:

* Read before the Microscopical Society of Dublin, 1841, and communicated by that Society.

The thickness of the covering glass can be varied at pleasure, and when not used as a compressor, it answers the purpose of a holder for microscopic sliders, as it is easily adapted to glasses or sliders of various thicknesses. It can also be used as a fine adjustment, with the advantage of a safety stage.

The accompanying sketches exhibit a view of the whole instrument, and also the various parts separated, which can be done in one instant by taking out the pin G.

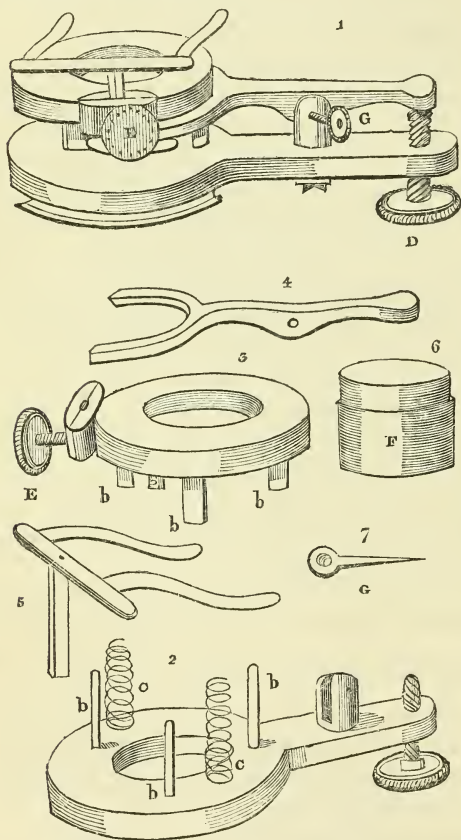


Figure 1 represents a view of the Compressor, showing the complete instrument.

Figures 2, 3, 4, 5, and 6, are the parts separated, which can be readily effected by taking out the pin G, Fig. 7.

The parallel motion is produced by the three sockets, b, b, b, Fig. 3, fitting smoothly on the three pillars b, b, b, Fig. 2.

Figure 2, c, c, are two spiral springs (retained vertical by pins in Fig. 3) which tend to separate Figs. 2 and 3, while the milled-head screw, D, acting on the end of the forked lever, Fig. 4, gives any distance between the glasses, or any required pressure.

The T piece, Fig. 5, with its springs, holds any piece of glass, or any slider that may be required; it is clamped by the milled-head screw at E.

F is a cylindrical tube fitted easily to Fig. 2, and passing through to the upper surface of Fig. 3, holding the bottom glass, which may be flat or concave, as occasion may require.

The covering glass may be of any thickness, or any shape or size that will fit under the springs.

This compressor is adapted to fit on any of the improved microscopic stages.

IX.—DESCRIPTIVE CHARACTERS OF TEN NEW GENERA OF INFUSORIA.*

By M. Ehrenberg.

I. AMPHITETRAS.—Wurkelfette.

Char. Gen.—Animal polygastricum e Bacillariorum familiâ ejusque Naviculaceorum sectione; liberum; lorica simplici bivalvi aut multivalvi (silicea); cubica; imperfectâ spontaneâ divisone in catenas non hiantes rectasque abiens; aperturis in utraque laterali opposita facie quaternis, ad angulos sitis.

Cum *Biddulphia* et *Denticella* proximè ad *Fragilariam* accedit, a *Staurastro*, cui formâ similis, longius recedit.

Spec.—A. antediluviana.—*Ehr.* 1839, p. 142.

II. CERATONEIS.—Schnabelschiffchen.

Char. Gen.—Animal polygastricum e Bacillariorum familiâ, ad Naviculacea accedens; liberum spontaneâ perfectâ divisione geminatum aut solitarium, nunquam cateniforme; lorica simplici prismatica bivalvi silicea; aperturus loricae duabus oppositis mediis, margine solido rimam longitudinalem utrinque interrompentibus.

Forma *Naviculæ* apicibus in cornua longè attenuata productis.

Spec.—1. C. Closterium. *Ehr.* 1839. Tab. iv. fig. 7. p. 144. † — 2. C. fasciola. *Ehr.* 1839. Tab. iv. fig. 6. p. 144.

III. DINOPHYSIS.—Krausenthierchen.

Char. Gen.—Animal polygastricum e Peridinaeorum familiâ; liberum; loricae (membranaceæ) sulco transverso ciliato et crista media plicata insignè, ocellis carens.

Forma *Vaginicola* liberæ, natura *Peridinii*.

Spec.—1. D. acuta. *Ehr.* 1839. Tab. iv. fig. 14. p. 151. — 2. D. Michaelis (=D. limbata) *Ehr.* 1839. Tab. iv. fig. 15. p. 151.

IV. EUCAMPIA.—Cirkelthierchen.

Char. Gen.—Animal polygastricum e familiâ Bacillariorum, ejus-

* From the *Abhandlungen der Koniglichen Academie der Wissenschaften, zu Berlin, Auf der Jahre, 1839. Berlin, 1841.*

† The plates, to which the above figures refer, will be found in the same work.

que Desmidiaceorum sectione; liberum; lorica simplici univalvi, complanata, cuneata, in utroque medio latere excisa; divisione spontaneâ imperfectâ in tœnias planas articulatas lacunosas curvas, paulatim circulares, abiens.

Odontellæ curvatæ *Eucampiæ* formam referunt, sicut *Fragilariæ* curvatæ *Meridii* fere characterem præ se ferunt.

Spec.—E. Zodiacus. *Ehr.* 1839. Tab. iv. fig. 8. p. 151.

V. GRAMMATOPHORA.—Schrifschiffen.

Char. Gen.—Animal polygastricum e familiâ Bacillariorum sectione Naviculaceorum liberum (sæpe implexum nec affixum); lorica simplici bivalvi (silicea) et prismatica; spontaneâ imperfectâ divisione in catenas dehiscentes flexuosas abeunte, Tabellariam æquans, ab eaque dissepimentis duobus internis, très loculas longitudinales formantibus, diversa.

Tabellariam refert plicis duabus internis siliceis, sæpius ad scripturæ modum flexuosis, insignem.

Spec.—1. *Grammatophora Africana*. *Ehr.* 1839, p. 152. (Syn. *Navicula Africana*, 1838.)—2. *G. Angulosa*. *Ehr.* 1839, p. 153.—3. *G. Mexicana*. *Ehr.* 1839, p. 153.—4. *G. Oceanica*. *Ehr.* 1839, p. 153. (Syn. *Bacillaria Adriatica*, Lobarzewski.)—5. *G. Undulata*. *Ehr.* 1839, p. 154.

VI. LITHODESMIUM.—Crystall-kette.

Char. Gen.—Animal polygastricum e Bacillariorum familiâ, ejusque Desmidiaceorum sectione; liberum; lorica simplici univalvi triangulari (silicea): spontaneâ imperfectâ divisione in bacilla rigida triangularia re abiens.

Characteres *Desmidii*, sed lorica tringula silicea, aut cute sponte divisa.

Spec.—*Lithodesmium undulatum*. *Ehr.* 1839. Tab. iv. fig. 13. p. 155.

VII. Podosira, Stiel-kette.

Char. Gen.—Animal polygastricum e Bacillariorum familiâ et Echinelleorum sectione, affixum; lorica pedicellata bivalvi subrotunda (silicea); spontaneâ imperfectâ divisione moniliâ formans.

Gallionellis affines formæ pedicellatæ, affixæ.

Spec.—*Podosira nummuloides*. *Ehr.* 1832, p. 138. (Syn. *Trochiscia moniliformis*, Montagne, 1837. *Melosira hormoides*, Mont. mscr, 1838.)

VIII. TRICERATIUM.—Dreieckthierchen.

Char. Gen.—Animal polygastricum e familiâ Bacillariorum ejusque Naviculaceorum sectione; liberum; lorica bivalvi triangula (silicea) in utroque latere tridentata vel corniculata; spontaneâ divisione longitudinali sub cute multiplicatum.

Biddulphiam triquetram aut *Desmidium* siliceum refert.

Spec.—1. *T. favus*. *Ehr.* 1839, p. 159. Tab. iv. fig. 10.—2. *T. striolatum*. *Ehr.* 1839. Tab. iv. fig. 9. p. 159.

IX. TRIPODISCUS, Sieb-dreifuss.

Char. Gen.—Animal polygastricum e familiâ Bacillariorum, ejusque Naviculaceorum sectione; liberum; lorica bivalvi rotunda (silicea) in utroque latere tribus processibus appendiculata; sponte longitudinaliter dividuum.

Coscinodiscus corniculis seu pedicellis utrinque tribus et *Triceratium* rotunda *Tripodisci* characterem enuntiant.

Spec.—*T. Argus*, *Ehr.* 1839. Tab. iii. fig. 6. p. 159.

X. ZYGOCEROS, Doppelhörnchen.

Char. Gen.—Animal polygastricum e Bacillariorum familiâ et Naviculaceorum sectione; liberum; lorica bivalvi, compressa, naviculari (silicea), utrinque corniculis duobus perforatis insigni, sponte longitudinaliter perfecte dividuum.

Biddulphiam liberam, perfecte sponte dividuam, hinc nunquam concatenatam nec affixam æquat.

Spec.—1. *Z. Rhombus*. *Ehr.* 1839. Tab. iv. fig. 11. p. 160. — 2. *Z. Surirella*. *Ehr.* 1839. Tab. iv. fig. 12. p. 160.

Extracts and Abstracts from Foreign Journals.

[From the *Archives generales de Medicine*.]

Flourens on Mucous Membranes.—By means of a slow and methodically conducted maceration, three superimposed layers may be isolated from the pituitary, tracheal, and vesical mucous membranes; the more external one, which is the most delicate, is the epithelium; beneath it is the true mucous layer, and the deepest seated is the derm. The same structure exists in the internal membrane of the arteries, which by some anatomists is classed with the mucous membranes. Maceration is better than the process of boiling, employed by Malpighi, for ascertaining the nature of these membranes, for instead of a mucous network, seen by this author, a continuous and entire layer is obtained.

[From *Müller's Archives*, 1841.]

Müller on Parasitical Formations.—A question arises, How far have we a right to look upon very minute formative bodies occurring in the interior of other organisms, as parts of such organisms themselves; and when should we, on the other hand, from their peculiar nature, regard them as strictly foreign?—So long as these pathological bodies do not depart from the general nature and properties of the subordinate cells; and so long as they do not possess structure and properties foreign to one of the whole of the subordinate cells; so long are the pathological productions to be looked upon also as parts of the organism in which they occur. This axiom respecting pathological cells does not include the power of extension of disease from one part of diseased vegetating bodies to other parts. Of this kind of *Seminia morborum* I have already spoken elsewhere. The extension of such from one organism to another, must, from what we already know of the development and increase of subordinate cells, be looked upon as possible, though the individual proof of it may be difficult enough. That there are low and minute organisms, which not only in their condition of genus or species exist as simple cells, but which remain throughout their whole life as simple cells, is not to be considered impossible and rejected as absurd, although at present our knowledge upon the subject is unsatisfactory and but limited. In parasitical formations, their demonstration as such could not be shown, as they would be undistinguishable from their own subordinate similarly formative cells. If simple organic beings were present, their existence in such formations could be proved, by the cells living free in water, and propagating by the formation of new cellules. As yet, however, no such beings are known, as even the simplest organic bodies have either a different specific structure from the simple cells, like the *Psorospermia*, or are at least systems of cells grouped and connected together in special forms, like the cellular vegetables of fermenting matter, whose cells are loosened as *sporidia*, but which are joined together in a branched manner, in the fully developed plant. It is the same with respect to the Fungus of *Porrigo lupinosa*, which appears with the Fungus of fermenting matter, to belong to a common group. Cells with nuclei cannot be regarded as low organisms, as they completely simulate the common form of the subordinate cells, neither are they eggs or buds of organisms. Parasitical free cells without nuclei in fluid, it is true, depart from the type of the subordinate cells in such event, although it is often an error to look upon all cells in which no nuclei can be directly observed, as really deprived of them. I have often seen such cells without nuclei in pathological productions, and which in all probability were only subordinate cells and not true organisms. The phenomena of contagion may be regarded under three points—

1. Impartation of the sporidia of truly parasitical organisms. To such belong the muscardine of the silk-worm, Fungi upon living animals, *Porrigo lupinosa*, the particular disease of fish lately described by me, as well as the impartation of Entozoa and of their germs.

2. The spread and further development of pathological cells by germ (?) cells, as in cancer.

3. Contagion by means of matter formed in organisms, which, independently of organic structure in other organisms, gives rise to a sort of fermentation. (Liebig.)—*Heft.* 5, 1841.

[From *Valentin's Repertorium*, 1841.]

Ascherson on the Formation of Cells.—According to Ascherson, immediately oil comes into contact with liquid albumen, the drops of the former become surrounded with a membrane formed from the latter. Thus arises a series of artificial cells, which are not always round, but often elongated, club-shaped, or fusiform. Their membrane (Haptogen membrane) is very tough and elastic, and by pressure can be divided along with the drop of oil it contains, the envelope immediately closing at the separated spot. It is probable that analogous to his artificial mode of forming cells, the latter are developed in living organisms, through the contact of two heterogeneous fluids, particularly oil and albumen; and which cells, by means of endosmose and exosmose, produce further changes of their contents.

Pappenheim has described the ciliated epithelium of the pericardium of the Tritons, and also that of the inner surface of the mucous membrane of the tympanum in the frog. The latter statement is verified by Valentin.

Göppert on the Structure of Balanophora.—The cellular tissue (in whose cells a nucleus always exists) contains such a quantity of a peculiar waxy matter (Balanophorin), that the plant when lighted burns like a wax taper. By means of this substance and its white colour, this cellular tissue is distinguished from the approximate bark-cells of the mother-plant, which are of a red colour, and contain tannin. The plant has also a double vascular system, one of which springs from the mother-plant, and is subservient to the organs of vegetation; whilst the other, which has its origin in the cellular tissue of the plant itself, is subject to the system of generation. The former has the character of the woody bundles of the mother-plant, or that of a dicotyledonous structure; the latter is alone composed of striated vessels and elongated cells. The structure of the rhizoma, and the peduncle of the flower, is decidedly monocotyledonous. The vascular bundles, however, appear to be much simpler in their nature than those of most monocotyledons, and approach those of the ferns. Göppert agrees with Endlicher and Unger, in uniting the plant with the rest of the *Rizanthaceæ*, as a separate group in proximity to the *Filices*.

In some plants of *Drosera intermedia*, described by St. Hilaire and Naudin as springing from the leaf of another individual, no vessels could be found.

Payen on Primary Membrane.—Primary vegetable membrane, *cellulosa*,

has with *amidon* a similarity of composition, and can be converted into *dextrine* by the action of sulphuric acid. On the other hand, woody layers have a different composition, and are much richer in carbonic acid. *Cellulosa*, which can be obtained quite free when the contents of the cells have been removed by chemical agency, alone forms the walls of the young cells, and is to be again met with in the oldest cells. By means of this substance alone, the thickened cells of the perisperm of *Dracaena*, *Phytelephas*, *Phoenix dactylifera*, and the pithy membrane of *Aeschynomene*, are generated. In the tubular walls of *Confervæ*, of the *Oscillatoria*, of *Fungi*, and in the leaves, vessels, and ligneous tissue of all the higher plants, a great quantity of matter rich in carbon, and which can be removed by caustic potassa, &c., &c., is superadded to the *cellulosa*. Transitional states, between *cellulosa* and starch, are also to be found. When the walls of the cells of Iceland moss have been freed from all foreign matters, they become blue by the contact of iodine and dilute; afterwards they may be dissolved by potassa, and changed by the agency of diastase into *dextrine* and sugar. Even the cellular walls of the horny perisperms of *Phytelephas* and *Dracaena* are affected by iodine, but present more opposition to further change. Though *cellulosa* and *starch* have the same elementary composition, they are distinguished by the different condition of their molecular aggregation; woody matter, on the other hand, consists not merely of liqueous substance rich in carbon, but also of layers of *cellulosa*; since after the action of reagents, which dissolve all the true ligneous substance, the laminae of lignification do not disappear, but are left behind in the form of a spongy *cellulosa-like* mass. [Vide Mohl on the Colouring of Vegetable Membrane by Iodine, Vol. 1. page 167 and p. 57 of the present number.]

Ehrenberg on Iridiscence.—The causes producing natural iridiscence under the microscope may be reduced to the three following heads:—
1. The presence of thin iridiscent plates. 2. Of sharp and delicate striation of surface. 3. Of minute symmetrically placed pores. This phenomenon is distinguishable from any chromatic colouring arising from the microscope itself, by its becoming less intense the more the magnifying powers of the instrument are increased.

Hoffman on Lemna.—The epidermis of the upper surface of the lamina of the leaf is composed of large unequal 4-8 cornered cells, between which the *stomata* are to be found. These organs are closed in all the submersed winter buds, but on the dry surface of the floating ones they are more open. The under surface of the lamina, as is the case in all water plants, is destitute of *stomata*. In the upper surface of the lamina no spiral or other vessels are to be seen.

The relations of the so-called *primitive band*, or the central axis of the primitive nervous fibres, have been again the subject of much discussion. Whilst Günther and Schön deny its existence in fresh nerves, Hanover maintains its presence in the peripheral and larger central nervous fibres, as, for example, in the floor of the fourth ventricle, and remarks that it takes no part in the production of varicosity.

Baillarger has alluded to the existence of six laminæ, of changeable grey and white substance, upon the surface of the convolutions of the hemispheres of the cerebrum, and which, according to him, simulate the arrangement of a galvanic pile. *Horn* describes a row of little knots (ganglia?) observed by him upon the nerves running to the secreting glands of the head. According to *Purkinje* and *Leuning*, the *pia mater* of the spinal cord is composed of longitudinal sensitive fibres, near which in certain spots exist elastic fibres which are not altered by the contact of acetic acid, whilst the sensitive ones become brighter, and at length invisible.

Gaultier de Claubry maintains the doctrine, that in air which has been deprived of all its organic particles by heat, no development of organised bodies can or will ensue. [This doctrine, the same as that deduced by *Schultze*, who, however, destroyed the organic particles by sulphuric acid, has been denied by *Dr. Willshire* to be satisfactorily supported, at least by *Schultze's* experiments. *Schultze's* paper will be found, *Microscopic Journal* Vol. 1, page 68; *Dr. Willshire's*, *Lancet*, page 255, Vol. 1, 1841.]

[From the *Bulletin de l'Academie de Bruxelles*, 1840.]

Lambotte on the Structure of Serous Membranes.—In 1836, some observations made on the *Batrachia* in the tadpole state, attracted his attention to the serous membranes of these animals, and he arrived at two conclusions. The first was relative to the intimate structure of these membranes; the second to the development of their form. It was stated that in the tadpoles of frogs the peritoneum was very rich in blood-vessels. At the time that the paper was presented to the Academy of Brussels, he was not altogether satisfied as to the correctness of the assertion; but the injections of the vessels on which he has experimented, leaves now no doubt in his mind on this point. At the present time, instead of considering the peritoneum as being *very rich* in blood-vessels, he is convinced it is formed *exclusively* of the ultimate ramifications of them. He is of opinion that this *network* of capillaries belongs to the three divisions, arterial, venous, and lymphatic; this conclusion is the result of numerous injections and observations, and he deduces from this fact, that *the lymphatic system directly communicates with the arteries, like the venous system, and without the intervention of the latter system*. In order to remove any doubt as to the above assertion, that serous membranes are entirely formed of the minute subdivisions of the blood-vessels, he proceeds to give the numerical valuations which have been furnished by his observations; these were made on portions of very thin membrane, and composed only of a single layer of vessels. In a small portion of the injected pericardium of a dog, he found on the side of a square surface of the $\frac{1}{30}$ th of a millimetre, consequently $\frac{1}{900}$ th of a millimetre square surface, 47 small canals perfectly injected; this gives a total of 42.300 for the number of

those observed on a square millimetre, and 423 millions on a square decimetre. With respect to the calibre of these capillaries, there are two kinds of little vessels: one, stronger, has a diameter of about 0.007 to 0.008 of a millimetre, and form a mesh-work, the openings of which are divided by smaller canals still more delicate, the calibre of which is but the 0.001 of a millimetre. The former are irregular in their form, varicose, &c.; the smaller ones, on the contrary, are much more regular, and separate (nearly all of them) at right angles from the former. The still larger capillaries (about $\frac{1}{50}$ th of a millimetre) are also distributed in considerable numbers in these membranes. They are the direct continuation of the arteries, and unite to form the veins without anything intermediate; they admit the globules of blood seen and described by him each time that he has examined the serous membranes of a living animal.

The *fatty matter* of serous membrane is deposited in the layers between the vessels, under the form of small spheroids, which take a polyhedral shape when they are numerous and close to each other. Each of these small nodules is encircled by a large number of very fine vessels, but which are very difficult to inject completely. He obtained some good results from animals in which the fat is scarce, particularly in the rabbit, cat, &c. It may then be seen that the fat is distributed around the vascular extremities, in small accumulations, very much resembling the appearance of foliage, when contrasted with the dendritic divisions of the capillaries. The number of vessels is so great in these masses of fatty globules, that they appear red when properly injected. The arrangement of the small vessels on the granules of fat is very similar to that which he observed on the liver of the dog. He has observed it also in the mesentery of the cat, where other similar globules were distributed.

He is led to believe that (le hile) of the adipose granules admitted by Raspail, is only the capillary vessel which carries the circulating fluid to the walls of the fatty globule. He is not aware if each fatty granule possesses a proper membrane, a pellicle independent of the small capillaries; but that is probable, if it be recollected that the contact of the albumen and fat gives origin to a solid membrane, which is developed between two substances; this contact is evidently the case in serous membranes.—*Part 2, p. 169.*

Valentin on the Structure of the Skeleton or Shell of the Echinus.—Although the title of this communication would indicate something developed by the powers of assisted vision, there is nothing described in the first part of it but what may be seen by the naked eye. But as remarked by the author, the animal possesses (as all the other Echinoderms) other kinds of systems of support, which can only be studied by the aid of the microscope. These are very briefly alluded to in this memoir. A more detailed account, with figures of all the parts, will be published in the first part of his *Anatomie des Echinodermes*, treating of the Echinus, which is intended to form a supplement to M. Agassiz's work, on the Zoology and Palæontology of this class of animals.—*Part 2, p. 81.*

Glüge on the Microscopical Analysis of the Matter of Cancer.—Dr. Glüge, of Brussels, in his paper on Experimental Researches on the Inoculation of Cancer, gives the following as the result of his microscopical observations:—1. The blood-globules are perfectly the same as in the healthy state; fibrine the same, and very elastic, 2. Whitish matter secreted by the wound. This is found to be composed of innumerable globules, very irregular in their form, as if injured by a corrosive acid, and much smaller than the blood-globules; they are found mixed with others three times their size, and a granular matter. *No trace of globules of pus.* This observation has already been verified by matter obtained from the living animal. 3. This whitish, very viscous and thick matter, is enclosed in the large tumour. The fluctuation is due to this semi-fluid matter in the cysts; it contains the same microscopic elements. Other tumours, as those of the liver, offer precisely the same globules, and form the same mass. They have much resemblance as to colour and external appearance to the globules which characterize cancer (encephaloid); but their size is only from the $\frac{1}{125}$ th to the $\frac{1}{130}$ th of a millimetre; they are then much smaller than the globules of pus, and approach, as to their size, the globules of blood. Their deep white hue gives the matter a whitish colour. This matter is coagulated by alcohol, without changing the character of the globules; ether also coagulates it without dissolving the globules, of which it only renders their interior of a deeper hue. Acetic acid produces a slight coagulation, without altering the globules. Nitric acid coagulates the matter, and gives to it a pale reddish tint, without producing any change in their form. By the addition of caustic liquid potass, the globules arrange themselves in small masses, their forms become less distinct, without disappearing all together, and the whole appears as a granulated surface. Liquid caustic ammonia produces only a slight coagulation, without altering the globules.

The conclusions arrived at by Dr. Glüge, after detailing the results of several experiments, are—1. The inoculation of ordinary healthy pus produces no alteration, either local or general, on the system. 2. By inoculating with cancerous matter, the effect is first local; a suppuration is soon established which *altogether disappears*, and then the secretion of the cancerous matter commences, which soon spreads to the surrounding tissues, and sometimes to the internal organs. This last condition is not even necessary as the animal sinks. 3. The cancerous matter is secreted as a liquid; it depends on the resistance of the tissues, which are destroyed by the cancerous matter, and the quantity of the latter, whether tumours are formed, or simple infiltrations of cancerous matter. 4. In the three experiments Dr. Glüge made, the cancerous matter appeared the same to the naked eye, under the microscope, or acted upon by chemical agents. 5. The cancerous matter obtained from an inoculated rabbit, was used to inoculate a second with perfect success. 6. In order that the inoculation be successful, it appears to Dr. G. requisite that the cancerous discharge be applied to the subcutaneous cellular tissue.—*Part 1, p. 425.*

[From the *Annales des Sciences Naturelles*, 1841.]

Costa on the supposed Parasite of the Argonaut.—M. Delle Chiaje was the first to record the existence of an organized body situated between the mantle of *Argonauta Argo* and its shell. He looked upon it as a parasite, and placed it among the worms in the genus *Tricocephalus*. The author does not, however, agree with him on this point.

It is furnished with a trunk, a terminal appendage, and two tentacular cirrhi. On the back of the body a double row of acetabuli form tubercles may be seen, which, like those cirrhi (veliferés) of the Argonaut, are adapted to the cavity in the keel of the shell. In the interior of the body there is a kind of pouch, divided into several partitions, and filled with a semi-transparent gelatinous substance of a rose or flesh colour, with spots, some of which are of a blood-red hue, and others, fewer in number, of a deep violet colour. There are also, besides these spots, others, symmetrical as regards form and arrangement, the colour of which is of a brighter red than the others.

At the pouch referred to, following the windings of the external membrane situated above, and on the internal part, a prolongation of mucus, constituting a kind of flap (*fanon*), from the larger part of which proceeded a cirrus, having its extremity divided into two tentacular appendages. The inferior part of this flap (*fanon*), is surrounded at the upper and lower borders by a very delicate fringed membrane. At the extremity there is an appendage of the form of a very long cirrus, which tapering successively, terminates in a very fine point. Towards its base a triangular membrane may be seen, traversed by two threads, given off from the same extremity, and which, in triply diverging, and enlarging, terminate before rejoining the margin of the membrane, to which it is stated they seem as points of support.

At length the outer surface of the membrane covering the ventricle (if it can be named such), is lightly and finely spotted with a deeper colour. The spots are formed of very small vessels, recurved nearly in a spiral.

In very rare cases, where the body under description was met with, it was always upon a female Argonaut, at the period of laying the eggs, which, as is generally known, are attached on the surface of the coil before the last of the spire. The supposed parasite adheres to the extremity of the same keel with such force, that it requires some effort to detach it. It is very moveable and contractile. The motions of its appendages are so very quick, that it is with difficulty the sight is able to distinguish them. And when the adhesion of the body to the internal surface of the shell is overcome, these movements resemble those of the tail of a lizard when separated from the body. The terminal cirrus is likewise curved in this case.

From what has been stated, it is very easy to perceive that this body, from its structure, cannot be considered as enjoying an independent existence; for it is not endowed with any special organ capable of prolonging life. The extremity appears to be divided in such a manner,

that it is possible to imagine this supposed insect was mutilated at this point, or that it is an integral part of the mollusc to which it belonged. But the Argonaut has been frequently found deprived of this corpuscle; and, on the other hand, individuals in which they have been met with, did not offer any cicatrix or trace of mutilation. Thus it cannot be doubted that this body is only an accessory part, probably destined for fecundating the eggs; in a word, the *spermatophore* of the Argonaut, which is the analogue (without being altogether the same) to that discovered by M. Milne Edwards in several other genera of animals, and particularly in *Sepiola*.

It must be allowed, that the limited observations set forth in this note, are not sufficient to establish the part and the functions performed by this body. It is, however, nevertheless believed, that these remarks may be of service to those desirous of pursuing these researches, without allowing the preconceived and singular opinion of those who would consider this body as a true parasite; and, lastly, should it be so, the supposed *Helminthus* would be the *Hectodactylis* (Octopodis, Cuv.), and not a *Tricocephalus*, with which it has not the slightest relation.—*September, p. 184.*

Researches on the Structure of the Nucleus of the Genera Sphærophoron of the Family of Lichens, and Lichina of that of Byssaceæ. By C. Montagne, D.M.—We have in a former number (Vol. I. p. 122) given Dr. Montagne's researches on the nucleus of Sphærophoron, and shall now record those on the genus Lichina.

C. Montagne on the Nucleus of the Genus Lichina.—After giving the results of the observations of previous Cryptogamists on this subject, Dr. M., according to his usual custom, was desirous of confirming the facts advanced by his predecessors. For this purpose, he obtained a mature apothecium of *Lichina pygmæa*, and divided it in two portions, in the direction of its length. By means of a very sharp lancet-shaped instrument he raised a thin layer parallel to the first section. Having placed this in a drop of water between two plates of glass of the *compressorium* of Schiek, he slightly compressed it, and submitted it to the microscope. A power of 600 diameters enabled him to see immediately that the mucilaginous nucleus (*lamina prolifera*) was formed of extremely fine filaments, erect, flexuous, curved back, and as it were enlarged at their superior extremity. These filaments are so delicate, that for a long time it was difficult to distinguish them from the mucilaginous nidus (gangue) in which they were placed, or rather which they constitute, and that no one had before seen, or their true form had not been hitherto described. Their diameter is full the $\frac{1}{800}$ th of a millimetre, and their length varies from $\frac{1}{10}$ th to $\frac{1}{50}$ th of a millimetre. They are slightly enlarged at their extremity, which is bent and slightly re-curved. In the midst of these filaments may be seen with the greatest facility, provided mature apothecia are the objects of the examination, long thecæ or utricles, in different periods of development. Some, very short, only contain in their centre a mass of shapeless sporidia, slightly green, which extend nearly the whole length of the tube. Others also

contain sporidia, but still arrested in their growth and form. There are, lastly, others, and in the greatest number, containing sporidia in their perfect state. He is inclined to believe, that at the nearest point of their formation, these are arranged in a single row. At a later period some are placed two and two, causing the theca to be slightly swollen at the part they occupy. These thecæ are shorter than the filaments in the midst of which they are placed. They have a linear form, but are slightly narrowed towards the base. The membrane (anhiste) of which they are constituted must be of the most delicate kind, for they burst betimes to allow the sporidia to escape, as is seen in many of the Lichens and Hypoxylæa. The sporidia, the usual number of which is eight, have an elliptical or oblong shape. Their length is $\frac{1.4}{5.00}$ ths, or nearly $\frac{3}{100}$ ths, and their breadth rather more than $\frac{1}{100}$ th of a millimetre. They mostly contain a cellular greenish substance, and are surrounded by a well-defined transparent border or margin. At other times they are quite empty and pellucid, marked only with a fold in the direction of their length. These facts, very easily verified, says Dr. M., were observed in a specimen of *Lichina pygmæa*, I collected in 1824, on the coast of Brittany. Dr. M. then states, that although the thecæ and sporidia may be distinctly seen with a power of 340 times, and even less, the free extremities of the filaments or paraphysa cannot be distinguished, but with that magnifying 600 diameters, and with good achromatic lenses. At the present time, that this plant is placed among the Phyceæ, or, by the example of Fries, who places it in the tribe of Collemaceæ, and by the side of the genus *Synalyssa*, a position where analogy would seem naturally to place it, it is to be understood that the structure of the nucleus, identical to that met with in the Lichens, is such as I am about to describe, and not that which has been received to the present time.

As regard its structure, the nucleus of *Lichina confinis*, compared to that of the preceding species, only offers a difference in the size of its parts. This ought partly to be expected, as the plant is only one half the size. The filaments, thecæ, and sporidia, are then formed, as in *S. pygmæa*. The sporidia only offer the remarkable character of being one-third shorter than in the latter species, and have at the same time an equal breadth, which makes them appear almost spherical. In a young plant, collected by M. Durieu, at Gijon, on the coast of Spain, he observed that they were for the most part longer than wide, entirely pellucid, lying on each other, and plaited in the direction of their length, although always marked with a border or margin. At a more advanced age, they are turgid, filled with a utricular mass, and almost globular. This state, which he considers as the full growth, was seen in a specimen collected on the coast of Normandy by M. Lenormand.

From this it may be again seen, that if the *Lichina confinis* should be placed among the Byssacæ, or at least with the Lichens, if the intermediate family be not admitted, there is no good reason to allege for allowing *S. pygmæa* among the Phyceæ, as M. Fries claims, for, on this ground, there is more relation to the assertions of others than to his own observations.

The genus *Lichina* being composed only of these two species, there is but very little difficulty in distinguishing the one from the other.

The generic characters of *Lichina* appear to Dr. M. to be modified as follow :—

LICHINA. — *Apothecia* terminalia, prima globosa, poroque simplici pertusa, demum scutellato-urceolata; *nucleum* gelatinoso-filamentosum hyalinum foveolatum. *Ascia* erecti, ampli, lineari-clavati, *sporidia* oblongo-elliptica suboctona serie unica disposita continentes, paraphysibus tenuissimis apice crispulo-incurvis stipati.

Thallus cartilagineus, dictiotomo-ramosus, teres vel plano-compressus, olivaceo-nigrescens.

A beautiful plate, drawn by Dr. Montagne, exhibiting the structures above described, illustrates the paper.—*pp.* 146 to 156.

[*Explanation of the figures*, Pl. IV. Div. 1.—*a*, Vertical section of an apothecium of *Lichina pygmæa*, passing through the centre of the nucleus and magnified about 15 times. *b*, Mass of filaments, magnified about 380 times, and in which may be seen in *c, c*, two thecæ, having the sporidia arranged in a single row, whilst another theca *d*, exhibits this order slightly deranged. *e*, Five filaments and one theca, *f*, magnified 600 times. *g*, A ripe sporidium. *h*, Another, in which the utricular matter is not yet formed. *i*, Fructification of *Lichina confinis*, as seen and figured by Turner. *k*, Portion of a horizontal section of the same plant, such as was seen and figured by Greville, showing the radiating sporidia, and which are evidently dependent on the manner they are examined. *l*, Free sporidia seen separate, figured by the same botanist.]

Lallemand on the part which Zoosperms perform in Generation.—M. L. has given in this memoir of 45 pages, the results and the reasoning connected with this subject. We much regret that such an interesting and elaborate paper belongs more to the department of the physiologist than to the microscopist; and notwithstanding our desire to insert it, some discretion must be exercised in the selection of matters bearing more in accordance with our title.—*May*, 1841.

[From the *Comptes Rendus*.]

Payen on the Development of Plants.—At a recent sitting of the Academy of Sciences, Paris, M. Payen described the results of his late researches respecting the development of plants. According to the theory of M. Payen, resulting from former experiments, the substance which forms the elementary membranes of the tissue of all plants is the same in every species of vegetable. It contains only three elements combined, and in these proportions, viz., of carbon, 45, and of hydrogen and oxygen in the proportion in which they exist in water, 55. M. Payen calls this primary substance of vegetables, *cellulose*. If this composition changes ultimately, the change is owing to the fresh coats of cellulose, deposited by the progress of vegetation, being incrustated with many other organic substances; such, for example, as those to which wood owes its hardness.

Cellulose is composed of the same elements as starch; we can thus easily conceive how the latter substance, which is contained in the grains of corn, maize, barley, and an infinity of vegetable products, may contribute to the ulterior development of vegetation, by assimilating to the cellulose, to form other parts of the new fibres.

The fundamental distinction which M. Payen established between animal and vegetable tissue is, that all the membranes of the former are composed of four elements instead of three; viz., of carbon, hydrogen, oxygen, and azote. They have also distinctive properties; the animal tissue is coloured yellow by iodine; it yields an ammoniacal product by distillation, and produces a peculiar reaction with tannin, the bichloride of mercury, and with many other reagents, which form no similar combination with cellulose.

It was important to establish this distinction. At first the observations on this point appeared to assimilate the elements of these two great divisions of organised life; M. Payen having himself shown that all the organs of very young plants, without any exception, enclose in their cellular membranes extraneous substances, containing azote in abundance, so as to cause it to present the character of animal matter. It became necessary, therefore, to explain this apparent confusion. It now appears, however, by his more recent experiments, that the two general laws respecting the analogy and the difference between animals and vegetables are well established.

The new researches of M. Payen relate to the mineral substances extracted from the soil by the plants, to the products of their transformations, and to the places these substances occupy in the vegetable tissue.

Thus lime, which Fourcroy and Vauquelin believed could never exist in the state of carbonate in plants, was detected by M. Payen in this state in almost all leaves. The substances recently examined by M. Meyen in fig trees come within the class of general calcareous secretions noticed by M. Payen. He has found them in a great number of plants, and he demonstrates that so far from being, as M. Meyen believed, small extraneous gummy matters, they are real pedicel organs composed of cellulose, and intended to secrete the carbonate of lime in a tissue so fine that it escaped the observation of the German philosopher.

M. Payen has also discovered the presence, in most cases, of oxalate of lime in irregular crystals, diaphanous, agglomerated in small spheroids, bristling with points, in the midst of the green tissue and larger cells of the edgings of leaves; the membranes themselves of the tissue of leaves are incrustated with silica, diffused over their surfaces in such a manner that the skeletons of the leaves may be preserved after burning, if the operation be carefully performed.

These new facts will be the means, it is said, of establishing on a solid basis the theory for the improvement of soils, by enabling cultivators to ascertain beforehand the nature of those portions of the soil which adhere in the greatest proportion to the different plants cultivated on the same land. They may also serve to explain the practical fact, long since announced by M. Payen, that all gases or vapors which are

more acid than carbonic acid gas, are very injurious to the leaves of plants, whilst the carbonate of ammonia in the air, is extremely favorable to their growth.

Microscope for Medical Men.—At the sitting of the Academy of Sciences, Paris, on the 29th of March, 1841, a new Microscope was presented by Dr. A. Donné, which is specially adapted for medical men, to enable them to examine immediately, and at the bed-side of their patients, the nature of a substance, or of a morbid product, which it may be interesting to know. It is in fact a pocket Microscope, with nothing peculiar about it, only it is contrived so as by its simplicity and cheapness to extend the use of this instrument in medical investigations. It is proposed by the contriver of this pocket instrument, to render the microscope as useful in the observation of disease as it has been latterly rendered in the study of natural history and physiology. Within the last fifteen years, many distinguished French physicians have applied the microscope in the detection of disease, and in studying its character; and any adaptation of the instrument to that purpose like that of Dr. Donné, may be the means of extending the application of it in medicine. As soon as the construction of the instrument is known it will be inserted.

Ehrenberg's Report on the Natural Paper of Silesia, sent by M. Göppert of Breslau.—This was met with in Silesia in 1736, by the overflowing of the river Oder, and is preserved in the library at Breslau. The microscopic analysis of this substance by Ehrenberg, communicated to the Berlin Academy on the 24th of June 1841, has proved that the principal mass of this web-like substance, consists of a species of the genus *Conferva*, which most probably, as is supposed by Göppert, is the *C. fracta*. Intermixed with the web, formed by this *Conferva*, are many Infusoria, which are sometimes separate and sometimes agglutinated. Ehrenberg has divided these into nineteen species :—

- | | |
|-----------------------------------|--------------------------------------|
| 1. <i>Synedra Ulna</i> . | 11. <i>Eunotia granulata</i> . |
| 2. <i>Cocconema lanceolatum</i> . | 12. ——— <i>Westermanni</i> . |
| 3. <i>Gallionella crenulata</i> . | 13. ——— <i>Zebra</i> . |
| 4. <i>Gomphonema gracile</i> . | 14. ——— <i>amphioxys</i> . |
| 5. ——— <i>acuminatum</i> . | 15. <i>Cocconeis undulata</i> . |
| 6. ——— <i>truncatum</i> . | 16. <i>Trachelomonas volvocina</i> . |
| 7. <i>Himantidium Arcus</i> . | 17. <i>Thylacium orbiculare</i> . |
| 8. <i>Navicula viridula</i> . | ————— |
| 9. ——— <i>viridis</i> . | 18. <i>Arcella vulgaris</i> ? |
| 10. ——— <i>amphioxys</i> . | 19. <i>Volvox Globator</i> ? |

Consequently the composition of this paper-like mass is very different from all earlier ones. Seventeen of the above-named microscopical animalculæ have a silicious shield, and two are of a soft character. Within it there are Infusoria at least 105 years old, true historical mummies,

and which also constitute an addition to the Fauna of Silesia. No new species have been discovered in it.

Letellier's Microscopic Experiments on Blood, Plastic Lymph, Pus, and Milk.—The following are the conclusions at which the author arrives as the results of his experiments:—1st, It is not possible to prove by the microscope that the red globules of human blood are formed of a nucleus and pellicle; 2nd, But the microscope and chemical agents prove that these globules are formed of an envelope probably fibrinous, and of a transparent full nucleus; 3rd, This nucleus offers the chemical properties of albumen coagulated by an acid; 4th, The albumen is evidently formed of transparent grains, becoming opaque where they are precipitated upon each other by alcohol or acids; 5th, Plastic lymph which runs from wounds, carries all the elements of blood but the red colour of the globules; 6th, Pus principally contains, (a) a great number of globules of blood deprived of colouring matter, and rendered opaque; (b) a small quantity of vesicles of very varied forms and dimensions, formed by cells of fibrine; (c) the debris of fibrine.—*L'Experience*, Oct. 1, 1840, in *Dr. Forbes's Medical Review*, Oct. 1841.

Ehrenberg on the Dust of Diamonds.—From experiments he has made on the dust of diamonds, he has found that a diamond superficies of $\frac{1}{1000}$ th of a line in diameter presents a much more vivid light to the naked eye than one of quicksilver of the same diameter. He has not been able to find smaller particles of diamond dust possessing a good lustre. The smallest particles were from $\frac{1}{1000}$ th to $\frac{1}{3000}$ th of a line in diameter: but even under the microscope no lustre was to be perceived. This, perhaps, was owing to the treatment. The result arrived at is, that fluid metals, since a small part only of their globular superficies shines strongly, make perceptible only very small particles of light; that in proportion much smaller lamina, especially diamond lamina, may be at last as easily discerned as considerably larger metallic globules. Whether the proportion is as 1 to 3, further investigations must teach us. Particles of light having a linear form constitute the utmost limit of the power of vision; and the luminous or light-reflecting corpuscles are the fixed stars of the microscopic world.—*Poggendorff's Annalen*, translated in *Taylor's Scientific Memoirs*, Vol. I. p. 583.

Gilgenkrantz on Vegetation in Solutions of Arsenic, &c.—This observer has seen a plant of the genus *Leptomites* or *Hygrocrocis*, form in a solution of arsenic. This observation, communicated by M. Bory de St. Vincent, proves, that arsenic, a substance so very poisonous, and supposed to be destructive to all organized bodies, is however favourable to the vegetation of some plants. M. Bory St. Vincent also states, that M. Dutrochet had observed, about ten years ago, the development of a similar plant in a solution of the Acetate of lead.—*Journal de Chimie*.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

Anniversary Meeting, February 15th, 1842. Richard Owen, Esq., F.R.S., &c., President, in the Chair.

THE following reports were read :—

Report of the Council.—The Council have to report to the Society that the number of its members now amounts to 185. That the collection of microscopic objects consists of about 150 specimens, and that upwards of ten volumes have been added to the Library since the last report, all of which have been presented to the Society. That the number of papers read during the past year has been fifteen. Two of the three microscopes ordered by the Society have been completed, and are in their possession, and the third will shortly be ready. A cabinet capable of containing many thousand objects has been purchased, and is now fit for the reception of any donations that may be made. The publication of some of the earlier papers is in progress, and one or more will soon be ready for distribution.

Auditors' Report.—We have examined the Treasurer's account with the Vouchers for the year ending at this date, and find the balance in favour of the Society to be £226 3s. 4d., of which £210 8s. are at Lubbock and Co's., and £15 15s. 4d. in the Treasurer's hands.

Jan. 17, 1842. JOS. J. LISTER, }
M. I. RIPPINGHAM, } *Auditors.*

The receipt and expenditure for the year have been as follows :—

RECEIPT.			EXPENDITURE.		
	£	s. d.		£	s. d.
Entrance of Members for 1840	11	11 0	Rent a year and a half.....	30	0 0
" " 1841	3	3 0	Attendance at Meetings	5	5 0
Annual payments for 1840 ...	11	11 0	Oil.....	4	2 0
" " 1841 ..	97	13 0	Lamp.....	0	7 6
" " 1842 ..	21	0 0	Printing	11	14 0
Compositions	46	4 0	Stationery.....	2	7 0
Balance from previous year ...	290	15 3	Diagram Board.....	6	18 0
			Microscopes	140	14 6
			Cabinet and Alterations	47	10 0
			Binding Ehrenberg's Infusi- } onsthierchen..... }	3	4 0
			Commission to Collector.....	1	16 0
			Carriage and Sundries.....	1	15 11
Total.....	£481	17 3	Total	£255	13 11
Receipt	£481	17 3			
Expenditure ...	255	13 11			
Balance in favour of the Society.....	£226	3 4			

The President having read his Annual Address, the thanks of the meeting were voted him for the same; and it was proposed by Mr.

Ince, seconded by Mr. Newman, and carried, that the Address of the President be printed.

The law relating to the election of officers was then read, and the Society proceeded to ballot for the officers and members of Council for the ensuing year. The ballot having been taken, the following were declared to be elected *Officers*:—

President, Professor Lindley, F.R.S.; *Treasurer*, N. B. Ward, Esq., F.L.S.; *Secretary*, Mr. John Quekett.

New members of Council.—George Busk, Esq., Dr. Arthur Farre, F.R.S., W. Greening, Esq., Richard Owen, Esq., F.R.S.

In the room of—John George Children, Esq., F.R.S., John Dalrymple, Esq., F.L.S., John Edward Gray, Esq., F.R.S., George Loddiges, Esq., F.L.S., who retired from the Council.

The meeting then adjourned.

Wednesday, February 16th. Professor Lindley in the Chair.

MR. WHITE's paper was read, "*On Fossil Xanthidia*." (See the abstract inserted, p. 35.)

Some discussion between Professor Owen, J. S. Bowerbank, and the author ensued.

The following gentlemen were elected members:—Professor Rymer Jones, Messrs. Thomas Neats Moody, William White Cooper, John Howard, Jun.

Microscopical Memoranda.

On the Structure of the Cuticle of Gramineæ.—In the September number of the London and Edinburgh Monthly Medical Journal for last year, we find that Dr. Douglas MacLagan has described a *new* structure which he is not aware of having been previously noticed, occurring in the cuticle of the husks of the grains of oat. This structure, which we noticed at the meeting of the 16th of April, 1841, is briefly recorded in the report of the Botanical Society's proceedings inserted in the "*Inventor's Advocate*," Vol. IV., page 267, and is not peculiar to the seed, but is found in the cuticle of the stem, and every other part so invested. A diagram was also exhibited at that meeting similar to that given in the work above quoted. We quote the passage in connection with the subject:—"If a thin section of the glazed cuticle or outer covering of the straw, which is of a silicious nature, and on which its durability depends, be examined microscopically, it will be found to be composed of elongated cells of cellular tissue, the walls of which appear to be divided transversely by means of tortuous lines. It is in this part of the cuticle (skin) Mr. D. Cooper considers the *silex* is deposited. On proceeding towards the ligneous structure of the straw, beautiful examples of the *Annular Ducts* were found, having the rings of fibre enclosed in the sheath of the vessels variously and beautifully arranged."—*Editor*.

Gulliver on the oval Corpuscles of the Cysticercus.—If the opaque part near the head of this Entozoon be gently pressed, a little rather viscid fluid will escape, which on examination will be found to be pervaded by a great number of oval corpuscles, presenting a very beautiful microscopic object. They have a remarkably distinct dark outline, with a brilliant surface, semi-transparent, and apparently homogeneous, except very rarely, when they appear to contain an inner corpuscle or cellule. They are generally but slightly oval, their length often scarcely exceeding their breadth by a third, though they may occasionally be seen nearly twice as long as they are broad. A common size of the corpuscles is about $\frac{1}{1300}$ th of an inch long, and $\frac{1}{2000}$ th broad. The bladder-like body of these hydatids is everywhere pervaded by distinct spherules, presenting a bright oil-like appearance, varying in diameter from $\frac{1}{20000}$ th to $\frac{1}{4000}$ th of an inch. They have no resemblance whatever to the oval corpuscles. Hydatids are described as being without discernible generative organs. Whether the remarkable oval corpuscles be ova or gemmules, must be determined by future observation. That they are the former appears probable, from their form and general regularity of size. Besides, they are situated in one particular part of the parent, never appearing in the walls of the transparent sac. If this conjecture should be confirmed, the *Cysticercus* can no longer be regarded as destitute of any distinct generative organ, for the part in which the ova are contained will correspond to the uterus of the higher Entozoa, and probably lead to a further knowledge of the method by which the different species of this genus are propagated.—*Proc. Zool. Soc. Lond. March 10, 1840.*

Locality for Lepisma and Podura.—The *Lepisma* is rare (one specimen only having been met with), and *Podura* by no means uncommon, the former in a kitchen, the latter in a damp beer-cellar in Blackfriar's Road, London. The *Lepisma* appears to prefer a warm situation, viz., a cupboard by the side of the fire-place; while the *Podura* is most abundant on damp wood work in a moist cellar. We have but little doubt that these interesting insects are more general in the metropolis than is usually supposed, and should therefore recommend our readers in want of them to search carefully in such situations, for the purpose of obtaining test objects.—*Editor.*

Owen on the application of the Microscope to Palæontology and Geology.—When we submit to the microscope the structure of a piece of drift wood, buried from ancient times in the Eocene-clay deposits of the great estuary of the diminished but still noble river that flows past our metropolis,—when conditions of the vegetable structure are detected in the fossil,* to which the nearest approach is made in the ligneous tissue of that family of plants from which the pepper of commerce is obtained,—do we not derive from such a comparison a conviction that these pri-

* Allusion is here made to Mr. Bowerbank's paper "On the structure of Fossil Wood from Herne Bay."

mæval *Piperaceæ* must have co-existed with the vultures, turtles, crocodiles, and boa constrictors of Sheppey, under atmospherical conditions more nearly approaching to those of a tropical climate than any dependent on the mere equalization of temperature, little if at all superior, in the average, to that which now prevails in the south of England?

And if the microscope is thus essential to the full and true interpretation of the vegetable remains of a former world, it is not less indispensable to the investigator of the fossilized parts of animals. It has sometimes happened that a few scattered teeth have been the only indications of animal life throughout an extensive stratum; and when these teeth happened not to be characterized by any well-marked peculiarity of external form, there remained no other test by which their nature could be ascertained, than that of the microscopic examination of their intimate tissue. By the microscope alone could the existence of Keuper-reptiles in the lower sandstones of the new red system in Warwickshire have been placed beyond a doubt.

By the microscope the supposed monarch of the saurian tribes—the co-called *Basilosaurus*—has been deposed, and removed from the head of the reptilian to the bottom of the mammiferous class. The microscope has degraded the *Saurocephalus* from the class of reptiles to that of fishes; it has settled the doubts entertained by some of the highest authorities in Palæontology, as to the true affinities of the gigantic *Megatherium*, and by demonstrating the identity of its dental structure with that of the sloth, has yielded us an unerring indication of the true nature of its food.

In ancient times the phyllophagous giants of the South American continent could uproot and haul down the loftiest members of a tropical forest, and at their ease strip them of their foliage; the puny sloths—their representatives in modern times—since they are unable to bring their leafy nutriment to the ground, are compelled to carry their mouths and stomachs to their food.—*Extract from Prof. Owen's Address, read at the first Anniv. Micros. Soc. Lond., Feb. 15. 1841.*

Addendum to the description of Mr. Powell's Microscope.—The following table exhibits the magnifying power of the object-glasses with each eye-piece of Messrs. Powell and Lealand's instrument, described at page 177 of Vol. I. of our Journal, and which arrived too late for insertion in the proper place.

Magnifying power of the Object-glasses with each Eye-piece.

Inch	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2
First and longest	700	330	170	75	40	20
Second	1400	660	340	150	80	40
Third and shortest	2500	1200	600	250	140	70

X.—ON THE OCCURRENCE OF A NEW ACARUS (?) FROM A PUSTULE
IN A SAILOR'S FOOT.

*By George Busk, Esq., Surgeon to the Hospital Ship,
Dreadnought, &c.*

THE figure of this *Acarus*, given in Plate IV., Div. 7., was found beneath the cuticle of the sole of the foot of a negro, under the following circumstances:—He was admitted into the Seaman's Hospital Ship last autumn, with large sores of a very peculiar character, and confined to the soles of the feet. On examining the secretion of these sores, the insect was found, but dead, and apparently partially crushed, as represented in the plate. It appeared that the disease was caused by its burrowing immediately beneath the thick cuticle, which thus became irregularly detached, being, as it were, undermined by galleries branching in all directions. The disease was attributed to the wearing of a pair of shoes which had been lent to another negro, whose feet had been similarly affected for nearly a year, and who wore the shoes thus lent for a day or two. The negro so under my care was a native of, and came from, the West Indies, and was not aware that a disease like his was ever known to occur there; but the negro to whom he had lent the shoes came from Sierra Leone; and this circumstance is very remarkable in conjunction with the fact, that in some water brought by Dr. Stanger from the river Sinoe on the coast of Africa, one nearly perfect specimen, and fragments of others very similar, if not of this identical *Acarus* were found, rendering it probable that the first man contracted the disease under which he had laboured so long, from some external source. It may not be, perhaps, improbably supposed, that the insect may eventually prove to be the parasite of some aquatic bird, or other animal frequenting watery places. The remains are too imperfect to allow of an exact description being given; but from all the comparison and inquiry I have been able to make from those best informed in these matters, it would appear that this *Acarus* will form a distinct genus from those hitherto described, and that it would be placed near the genera *Sarcop-tes* and *Hypopus*. A not very dissimilar parasite has been found lately by Mr. J. Quekett, beneath the skin of some bird, I believe an aquatic one, and this will render the supposition I have hinted at the more probable.

[We are informed by Staff Assistant-Surgeon P. D. Murray, that at

Sierra Leone there is a native pustular disease called *craw-craw*, which is a species of itch breaking into open sores, and very troublesome to cure. May not the above insect be the cause of this intractable local disease, in the same manner as the *Acarus* is of the common itch?—*Editor.*]

XI.—ON A PECULIAR SUBSTANCE OCCURRING ON THE HUMAN TEETH.

By Frederick Buehlmann, Candidate of Medicine, Berne.

IN investigating the so-termed molecules of saliva of Henle, I was struck by a peculiar kind of thread-like bodies placed on a granular mass which displays itself, mixed with the epithelium of the mouth, and with tartar, in great abundance on the teeth. I am not aware that any one, with the exception of Leuwenhoeck (Opp. omnia Lugd. Batav., 1722, Tom. II, p. 40), had ever mentioned them; I was therefore induced to examine them with the more attention, and discovered as follows.

There exist on the teeth of all adults, especially on those on which deposits of tartar occur, or which have a tendency to form such deposits, forms which consist of a great number of thread-like bodies, and which occur of three different kinds.

1. There are on a granular yellow substance of circular or elongated form, beautiful fibres, which sprout from this parent substance like plants from a bulb. This elegant form is the rarest. I have however observed it several times, and Professor Valentin has also convinced himself of its existence. The vessels occur in the form of tufts, presenting the most beautiful curves.

2. The fibres appear singly, scattered and often broken amid the epithelium, the tartar, and the adhering slime of the teeth.

3. Entire masses are observed of fibres which wind irregularly, and are surrounded by the yellow granular mass, which are perfectly identical with those described as No. 1. The first of these forms is the most beautiful, and possibly the primitive. It has on its first appearance some similarity with the spermatic animalcules which are sometimes observed of a tuft-like form, or with certain appearances of mould in the animal kingdom. The vessels have a breadth of about 0.00006-8th of a Paris inch, and a length, which, as will be seen from the accompanying figures, is extremely variable. They possess at the basis the breadth cited above, preserve this breadth till about the middle, and diminishing thence,

terminate in a point. They are smooth, of a yellowish white, somewhat transparent, are elegantly curved or wavy; or, when they occur in the second form, are occasionally quite straight, and apparently stiff. Their elasticity however admits of no doubt, as in moving the plates of glass, they frequently turned and moved in various directions. Professor Valentin believes also that their surface is not granular, and their margin not varicose; although it sometimes had that appearance, as small molecules attached themselves to the surface, which did not belong to the constituent, but to the adhering portions of the form, as was plainly observable if the object was well in focus. Professor Gerber, however, has observed both these peculiarities. Farther and more complete investigations will probably decide this point. I never saw these fibres ruptured, yet broken parts are occasionally to be seen in the second form. Single fragments of these fibres, which are cylindrical and have a broad end on each side, may be perceived. The point of fracture is straight, and exhibits no protruding portions. As regards the occurrence of these forms, I have found that they exist only on the teeth, but not on the slime; that they occur both in young and old individuals, but more frequently and more abundantly in the case of older persons, who usually pay less attention to their teeth, which on this account are coated with slime and tartar. They then display themselves chiefly in the form of Nos. 2 and 3 equally on all the teeth. I have looked for them on my own teeth, after having first very carefully cleaned them with a brush, and have found them again. They are most numerous when a portion of slime lies between the teeth, and particularly towards the bases of the last teeth. As regards their chemical composition, I can only state at present, that acids leave this peculiar substance totally unaltered, or at most, only render it somewhat more transparent. The strongest nitric, sulphuric, or muriatic acids do not dissolve it. The most concentrated solution of caustic alkali produces no alteration of form. If consumed on a plate of glass, in a platinum crucible, the surrounding mass is changed into carbon, but these fibres remain unaltered. This however is only to be observed as regards those which exist on the margin of the blackened mass; the others, though certainly not consumed, are mechanically inclosed in the black substance, and therefore cannot be discerned with the microscope.

I beg to submit this sketch as a mere preliminary notice on the subject, in order that other and more competent observers may devote their attention to these objects, hoping myself to be able to communicate more complete information at a future period.

Finally, that this substance does not belong to the enamel of the teeth, will be readily perceived by every one who has inspected the enamel itself.*

Explanation of the Figures, Plate 2, Division 1.

Figs. 1, 3, & 4, Show the thread-like bodies as described under No. 1.

Fig. 2. Second form of the thread-like bodies, separated, and with a portion of epithelium.

Fig. 5. Third form of the thread-like bodies, surrounded by the granular mass, in which the fibres are sometimes very distinct.

Fig. 6. Single fibres of the thread-like bodies, some entire, and others probably broken.

Figs. 2 & 6, Are drawn under higher magnifying powers than the other figures.

XII.—OBSERVATIONS ON THE PROBABLE SOURCE AND EXTENT OF
INFUSORIA IN THE MUD OF RIVERS, ETC.†

By T. F. Bergin, Esq., of Dublin.

EHRENBERG, who has already reaped such abundant laurels by the application of the Microscope to the Arcana of Nature, has, during the last year made another very important communication to the Berlin Academy, a translation of which by Mr. Weaver, has recently appeared in Jameson's Philosophical Journal, and of which I observe an abstract in the Microscopic Journal, Vol. I. p. 162.

I refer to his Observations on the important part which Microscopic Organisms play in Choking up certain Harbours.

Having made the truly wonderful discovery, now so familiar to every microscopist, that extensive apparent mineral beds, and, in some instances, almost mountain ranges, are composed almost exclusively of the silicious or calcareous shells of animalcules, so minute, as not merely to be invisible to the naked eye, but even to require high magnifying powers to establish their existence, he was naturally led to inquire whether similar causes were still in operation, and has arrived at the conclusion that a very large proportion of the mud banks deposited by certain rivers flowing into harbours, consists of these organisms in the living state. In fact, a moderate estimate, based upon microscopic examination of the

* From Müller's Archiv. 1840.

† Read before the Microscopical Society of Dublin, January 1842, and communicated by the Author.

deposits at Wismar, Pillau, Cuxhaven, the Nile, and some other similar situations, shows that these organic forms amount to proportions varying from $\frac{1}{4}$ th to $\frac{1}{40}$ th of the whole deposit, or that the animal deposition within harbours, in some cases where circumstances admitted of an approximate measurement, amounts to many thousand cwts. annually. Such an announcement as this naturally excites the attention of every microscopist, and leads him to see whether such results are produced by all rivers, and if not, to ascertain, if possible, the cause of difference; and it is not altogether unimportant to place on record every fact, no matter how slight, bearing on so interesting a subject.

The only opportunity for observation which I have heretofore had, is as to the deposits of our own river, the Liffey. These, we know, are very great in quantity, so much so as to entail a serious expense on the curators of the navigation in maintaining dredging machines, for the purpose of preventing their accumulation to an injurious extent. The result of somewhat extended and very careful examination of these deposits during the last month (Dec. 1841) is, that they do not at all agree in character with those of the Elbe, and other rivers examined by Ehrenberg. I find but very few specimens indeed of a few species of *Navicula*, such as *N. striatula*, *N. Hippocampus*, *N. sigma*, *N. viridis*, and some few others, and heretofore I have found but one solitary *Polythalamous* shell; in fact the organic forms do not constitute $\frac{1}{1000}$ th part of the mass.

Receiving then the announcement of Ehrenberg with all the confidence which any observation of that eminent man deserves, we are naturally led to inquire, Whence this remarkable difference?

The rivers, the deposits of which he has examined, flow for an immense distance through flat alluvial districts. The Liffey, and its tributary, the Dodder, both have their sources in the granitic mountains of the County of Wicklow, and within a very few miles reach the sea; in fact the waters of these rivers can be but a few hours in passing from their source to the sea, and a small portion only of their limited course is through alluvium; and to this, I conceive, may be attributed the remarkable difference. In the case of the long and slow rivers, the germs of these minute beings, received most probably from the drainage of the lands through which they flow, have time to attain maturity, and to increase and multiply; whereas, in the shorter and more rapid streams this cannot be.

It would be very interesting to examine the deposits of our great river, the Shannon, flowing as it does through almost the whole length of our Island, and, now sluggishly, now rapidly, through every variety

of soil. I hope some of our associates will do so, and let us know the result.

After having detailed his observations, to which I have referred, Ehrenberg adds that the extraordinary fertility produced by the mud deposited on the arable lands by the overflowing of the Nile, and of some other rivers, probably proceeds, not merely from the mechanical transport of soil, but from the vast mass of animal matters (the inhabitants of these minute shells) thus spread over the surface of the land.

The deposits of the river Dodder to a certain extent corroborate this view, as I know that the stuff spread over the adjoining lands, whenever it overflows its banks, produces an effect very far from fertilizing.

The notice which our friend Mr. Ball lately gave of the variety of organic forms which he observed in a morsel of mud from Plymouth Sound, bears on this point, as the rivers falling into that Sound, the Plym, the Tamar, the Tavy, and some others, all flow slowly and for a considerable distance through rich alluvial districts. It would also be interesting to examine the deposits of the Severn, the Dee, the Mersey, and as many other rivers as possible.

The subject is, possibly, not devoid of economic interest. Irrigation has frequently been resorted to for the improvement of land, but with very different results. It may be that in this discovery of Ehrenberg is to be found the explanation of these differences; and it is probably not too much to say, that an *à priori* examination of the mud of every river might enable the agriculturist to say whether he would derive benefit or the reverse by suffering its waters to overflow his ground.

XIII.—ON THE SUPPOSED STINGING ORGANS OF MEDUSÆ, AND THE OCCURRENCE OF PECULIAR STRUCTURES IN INVERTEBRATE ANIMALS, WHICH SEEM TO CONSTITUTE A NEW CLASS OF ORGANS.*

By Professor Rudolph Wagner of Göttingen.

It is well known that it has not yet been ascertained whether the stinging or burning power of *Medusæ*, is to be ascribed to a corrosive liquid, or to a mechanical injury. I think my investigations enable us to approach more nearly the decision of this question.

The origin of the stinging is, at all events, to be sought for in the

* From the Archiv für Naturgeschichte, 1841, Translated in Professor Jameson's Edinburgh New Philosophical Journal for January 1842.

external surface of the skin of the *Medusæ*. I have observed in a very beautiful and distinct manner the structure in the *Pelagia noctiluca*.* The outer skin is in that species of a beautiful brownish violet and reddish colour on the convex discoid surface, on the exterior arched edge of the arms, and on the lobes of the rim (*Randlappen*.) This variegated membrane is easily separated, especially over the greater part of the convex surface of the disc, and then there appears the homogeneous jelly-like substance which constitutes the real body of the animal. Where the red spots occur, we find, after the skin is detached, round elevations or inequalities, like warts.

By the assistance of a low magnifying power, the red spots appear like collections of very small red grains of pigment, in whose vicinity the whole body is covered by that kind of epithelium called a *Pflasterepithelium*, consisting of larger and smaller cells, which contain distinct nuclei. It is an epidermis analogous to that of the frogs and many other animals. The accumulations of pigment occur especially on the above-mentioned arched inequalities which arise above the surface, and have a substratum of muscular fibres.

Between the red grains of pigment are to be observed round balls or bubbles, out of which frequently, by the aid of a strong magnifying power (for this whole organization can only be recognised through the microscope), fine threads are seen to project. The largest of these balls present themselves as firm well-filled capsules of $\frac{1}{100}$ th part of a line in size, in which lies internally a spirally rolled-up thread, which often comes out of itself, but always does so on the application of a slight pressure. This thread then appears as a whip-like appendage to the capsule, and has a very elegant outline. It is difficult to form an idea of its structure: sometimes it seems as if it had a canal. When the capsule is closed, while the thread is still rolled up in it, we perceive an inequality to which the thread, when opened up, is attached, as if to a stalk; when stretched out, the fine thread is a line long.

These hair or thread capsules are very loosely attached, and easily fall, and are rubbed off along with the slime, when the *Medusa* loses its skin; they are found in quantity, as are also the threads themselves, in what is termed the stinging slime of the *Medusæ*, (which is nothing else but the cast off epithelium), as is easily ascertained when these animals are kept in vessels. With more difficulty there are loosened smaller, long-shaped, clear little capsules, from $\frac{1}{300}$ th to $\frac{1}{400}$ th of a line in size,

* The examination was made at Nice and Villafranca in the autumn of 1839.

which are partially covered with fine short little hairs, or whip-shaped appendages. If we compare the reserve teeth of crocodiles, sharks, and poisonous serpents, we cannot help considering these little capsules as reserve cells, when the larger ones are lost.

Such individual little organs also exist beyond the spots, and extend to the inner rim of the arms, and to the under surface of the disc, where they cease. At the rim of the disc there hang between every two lobed (*Randlappen*), alternating with the crystalline bodies of the edge (*Randköpern* or *Crystalldrusen*), fine long cylindrical threads of a violet colour. These are covered with shining hairs, and present a cylindrical epithelium, which rests on the muscular fibres; these threads are covered with numerous parcels of small stinging capsules.

It is known that the slightest touch of a *Medusa* causes a perceptible burning sensation, and I, together with several pupils who accompanied me in my travels, experienced it in bathing. This ensues more feebly or more strongly, according to the vigour of the animal. *Medusæ* only sting at parts of their bodies where the epidermis is preserved. We never experienced the sensation when we came in contact with portions in which the epidermis had been removed; a circumstance which happens frequently in living animals. If we place a separated portion of a *Medusa*, with its epidermis side on the bare skin, or if we rub off a little epidermis and apply it to the skin, a burning sensation is felt after a period of from a few seconds to a minute; after five minutes a slight redness appeared in my case, and then a simple lentil-shaped elevation, more frequently three or four, near one another. *Medusæ* swimming in the sea act much more strongly, and even the eruptive appearances called *Quaddeln* are produced, as in the case of *Essera* or *Urticaria*. The pain soon ceases. It lasted half a day with one of the party, Dr. Will, and after eight days, a redness was still perceptible.

The internal substance of the body (the so-termed jelly of the *Medusæ*) never stings, nor does the inner surface of the cavity of the stomach, nor the inner surface of the arms, where the pigment spots, the capsules, and the hairs are wanting. At the parts of the skin on which I allowed myself to be stung, I always found separated capsules and hairs. It is well known that all *Medusæ* do not sting; and, for example, I found no power of this kind in the *Cassiopea*; a microscopic investigation proved the absence of those capsules and hairs over the whole surface of the disc. On the other hand, an *Oceania* (allied to the *Cacuminata*) stings, but only with the edge threads, and in a much smaller degree than the *Pelagia*. An examination showed the

existence of capsules, but of a lengthened shape, with fine long threads. But these organs were much smaller and finer; they had a remarkable resemblance to the structures I described formerly as *Spermatozoa* of the *Actiniæ*. A new investigation of the *Actiniæ*, as, for example, of the *Actinia cereus*, convinced me that those structures formerly described as *Spermatozoa* are nothing else but stinging threads of the *Medusæ*; they stand closely studded round the feelers or arms, and on the exterior surface. The threads project from long-shaped capsules, with that remarkable movement which I have elsewhere described, and which I found again precisely as formerly. The same organs, but only in a different form, occur again in *Polypi*, as Ehrenberg and Dr. Erdl (one of my companions) found in the *Hydra*; and the latter discovered them also in *Veretillum*.

It is probable that the stinging has a mechanical and chemical origin; just as in the majority of what are termed poison-organs, we find a liquid which collects in a little bladder or capsule, and an apparatus capable of doing injury. So it is also with many stinging plants, as the *Loaseæ*, in which fine sharp hairs convey a juice, where circulation can be so beautifully observed.

More extended researches regarding these structures, provisionally considered as stinging organs, will make known much that is remarkable in reference to their occurrence, arrangement, structure, and movements, and will display great riches in respect to phenomena of organization.

XIV.—ON THE BLOOD-DISCS OF SIREN LACERTINA.*

By Professor Owen, F.R.S., &c.

AMONG the important generalizations which the numerous observations of recent microscopical anatomists have enabled the physiologist to establish, respecting the form and size of the blood-discs in different classes of animals, the most interesting seems to be that which Professor Wagner has enunciated respecting the relation of the magnitude of the blood-disc to the persistence of the branchial apparatus in the Batrachian order of Reptiles, on the occasion of his description of the blood-discs of the *Proteus anguinus*.

* Extracted from the Penny Cyclopaedia, Art. Siren, Sept. 25th, 1841.

The absolute size of these particles in that perennibranchiate reptile, in which they may be distinguished by the naked eye, renders them peculiarly adapted for minute investigations into the structure of the nucleus and capsule of the blood-disc; but the value of the relation between their size and the persistency of the external gills, must depend upon the correspondence of other perennibranchiate reptiles with the *Proteus* in this respect. The superior size of the blood-discs of the newts to those of the land salamanders and tailless Batrachians has been confirmed by Professor Van der Hoeven's observations on the blood-discs of the gigantic newt of Japan, (*Sieboldtia*, Salamandridæ, Vol. xx, p.p. 331, 332), of which a fine specimen has been for several years kept at Leyden; and I have been able to add another instance to the still greater relative size of the blood discs in the perennibranchiate reptiles, by the examination of those of the largest existing species of that family, the *Siren lacertina*, of which a specimen, twenty inches in length, is now (Oct. 15th, 1841) living at the Zoological Gardens. The blood was obtained from one of the external gills, and immediately subjected to examination. The blood-discs presented the elliptical form which hitherto, without exception, has been found to prevail among the air-breathing oviparous vertebrated animals; the ellipse was not quite regular in all the blood-discs; several were sub-ovate, a few slightly reniform and thicker at the more convex side; all were as compressed or disc-shaped, as in other Batrachians, with the nucleus slightly projecting from each of the flattened surfaces.

The nucleus did not partake in the same degree with these varieties of form, but maintained a more regular elliptical form; the varieties in question appearing to depend on pressure acting upon the capsule and the coloured fluid surrounding the nucleus. Yet when the ellipse of the blood-disc was, as it happened in a few cases to be, longer and narrower than the average, the form of the nucleus presented a similar modification of size.

The following is a table of the averages of many admeasurements of these blood-discs, made with one of Powell's screw micrometers:—

Long diameter	$\frac{1}{450}$ th of an English inch.	
Short diameter	$\frac{1}{850}$ th to $\frac{1}{870}$ th	"
Long diameter of the nucleus	$\frac{1}{1000}$ th	"
Short diameter of ditto	$\frac{1}{2000}$ th	"
Thickness of ditto	$\frac{1}{3800}$ th	"

(As viewed edgeways covered by the capsule.)

The nucleus was circumscribed by a double line, the outer one more

regular than the inner one, which appeared crenated. This appearance was due to the structure of the nucleus, or the contents of the nucleolar capsule, which was indicated by the outer line. These contents consisted, in every blood-disc examined, of a number of moderately bright spherical nucleoli sufficiently distinct to be counted, when viewed by a Powell's $\frac{1}{16}$ th inch objective, with the eye-piece magnifying 700 linear diameters; the ordinary number of nucleoli seen in one plane or focus being from twenty to thirty; the total number was of course much greater. The facility, as well as certainty of the demonstration of such a structure in a good microscope of the present day, will be readily admitted, when it is remembered, that the nucleus of the blood-disc of the Siren is three times the size of the entire human blood-disc. These tuberculate nuclei, when removed from the capsule, were colourless; the component granules or cells have a high refractive power; viewed *in situ*, they present a tinge of colour lighter than that of the surrounding fluid interposed between the nucleus and the capsule.

The external capsule of the blood-disc is smooth, moderately resisting, elastic, as was easily seen by the flattening of the parts of two blood-discs that might come in contact, and the recovery of form when they were floated apart.

As the fluid contents of the blood-disc in part evaporated during the process of desiccation, the capsule fell into folds in the interspace between the nucleus and the outer contour, these folds generally taking the direction of straight lines, three to seven in number, radiating from the nucleus.

Explanation of the Figures, Plate I., Division 2.

Blood-discs of Man and Siren, drawn by the Camera lucida, under a magnifying power of 700 linear dimensions.

3, Human blood-discs. 4, Ditto, viewed edgewise. (The upper portion of this figure has been drawn too wide; it should be the same as the lower part, 2, Siren's blood-disc. 1, Ditto, viewed edgewise. *a*, Folds of external capsule, produced by desiccation. *b*, *c*, Nucleoli; the capsule of the nucleus, seen enclosing the nucleoli.

Hints to Microscopists.—No. IV.

XV.—PRACTICAL POINTS CONNECTED WITH ILLUMINATION, ETC.

By Daniel Cooper, Surgeon, &c.

Lamps for Microscopic Purposes.—There is perhaps no greater difficulty the Microscopist has to contend with in his evening examinations than the obtaining a certain and sure light. It is a general opinion that there is none so certain, and can be equally relied upon, as the ordinary Argand lamp, well trimmed, and burning the very best sperm oil. But as the price of sperm oil is high, expedients have been resorted to out of number to burn *vegetable oils* of a much lower price, with the same advantage. Lamps trimmed with these oils, require either constant use, or being constantly and regularly cleaned; otherwise the oil becomes thick, clogs up the tube which conveys it from the reservoir, and the cotton becomes in like manner clogged, so that all capillary action becomes arrested, and it requires changing nearly every time that it is used, provided it is not constantly burned, and even then it becomes necessary to clear the tube occasionally. For the purpose of ensuring as complete combustion of these cheap oils as it is possible to obtain, many plans have been devised. Those most deserving of attention are, the *Patent Oxydator*, invented by Mr. Young, and the means devised by our correspondent Mr. George Gwilt, at page 56 of the first volume. Of these two contrivances that of Mr. Gwilt is considered preferable to the Patent Oxydator, as in case of the glass being broken it is the more readily obtained and renewed. The expense is much about the same.

As a portable means of illumination for microscopic purposes, and which may be readily carried in the pocket without the slightest inconvenience, is the *Portable Candle Lamp*, first made by Mr. George Jackson; it burns the candles manufactured by Molyneux and Co., which require no snuffing; these lamps may be obtained of Mr. Ross, Optician, Regent Circus, for six or seven shillings.

The light of coal gas answers admirably where it can be conveniently made use of. In those houses where gas is laid on to the sitting-rooms, as to chandeliers, a flexible tube may be readily adjusted to one of the pipes, which will convey the gas to a moveable gas lamp on the table beneath, as first done by Mr. George Lowe.

In cases where neither oil or gas illumination can be obtained, a portion of a wax candle in a low candlestick is to be preferred to a number

of candles placed however close to each other. In the absence of wax, composition, and then mould candles, should be sought for; the great disadvantage, however, of candle illumination, is the unsteadiness of the flame, from draughts and other causes.

Shades for Argand Lamps.—When these are made of metal, they become very hot, and radiate so much heat, as in many instances, when a brilliant illumination is required, and the lamp is placed near to the instrument, to produce considerable inconvenience to the observer. To obviate this, Mr. Nasmyth first used a double metal shade, the internal one being about a quarter of an inch less in diameter than the external; by this contrivance a current of cold air is constantly passing between the two, and keeps the outer one cool. These shades are best made with a double chimney, so as to encircle the lamp glass and to pass rather above it. This is a great addition to the ordinary shades for lamps.

If it be desired to illuminate the room generally, as well as the instrument, the paper shades answer best, such as are recommended by Mr.

Gwilt, and made in the following manner:—



“Take half a sheet of good foolscap paper, and strike thereon two semicircles, as in the diagram, the longest diameter being thirteen inches, and the shorter one four inches, fitting and adapting it

to the skeleton sliding frame, as the case may require, and then glueing or pasting the superfluous edges together. When once properly fitted, another pattern may (previously to the glueing of the edges) be traced out and kept at hand, from which any number may at any time be drawn, and a new shade made when wanted, in less than ten minutes. To get rid of the penumbral shadow, lower it down until it becomes almost wholly dissipated. These shades are much less fatiguing to the eye than the contrast occasioned by an opaque body in juxtaposition with a bright light, and they also diffuse a more subdued but useful light around the apartment.” — (Vol. I. p. 58.)

Illumination by Reflection.—Mr. G. Jackson, to whom microscopists are much indebted for various simple improvements in the construction of the instrument, employs a plano-convex lens of about two inches in diameter, and of four and a half inches focus, silvered on the plane side, and backed with a plate of brass or other metal, to fix a pin in its centre for the purpose of applying it to the microscope. This lens, when so treated, becomes a reflector of about two and a quarter inches

focus, and forms one of the best instruments that can be desired for throwing light upon an object viewed as opaque.

Mr. George Gwilt was the first to use the polished silver concave reflector for viewing opaque objects in the manner in which Mr. James Smith, under Mr. Gwilt's directions, fitted one to his microscope; it is the most simple and effective means yet devised, and the expense but little. Such a mode of illumination is preferable to that of the Lieberkuhn for more reasons than one. The first and very essential is, the not being obliged to cut up objects into pieces, as small or smaller than the *stop*, but the whole wing of a butterfly may be mounted, and every part of it easily seen. By this mode of illumination, also, a greater effect of light and shade can be thrown upon the object, so as to define many objects, such as the markings on the scales of moths, &c.; the disadvantage of the Lieberkuhn being, that the light is thrown too perpendicularly, and this effect is in a measure lost.

Glass for mounting objects.—The best glass for mounting objects upon is what is termed the *best flatted crown*, which is sold by the superficial square foot. Messrs. Chater and Haywood of Thames Street always keep a stock, and will accommodate microscopists.

The *very thin glass* is to be obtained of Mr. Drake, Jermyn Street, St. James's, who has for some time turned his attention to the subject, and has manufactured an article the $\frac{1}{100}$ th of an inch in thickness, which may be obtained for three shillings and sixpence per ounce. The thicker kind, $\frac{1}{50}$ th of an inch, may be had much cheaper.

Mica, or *Talc* (as it was formerly called) is now almost entirely superseded by the introduction of thin glass; it is very readily scratched, and is seldom obtained free from cracks. Those in the habit of mounting objects, never recommend the use of this substance for covering objects, when the thin glass can be obtained.

Cutting Glass.—Two kinds of diamonds are used by microscopists for this purpose. For cutting ordinary crown, or plate-glass, the common glazier's diamond is generally employed; but for the very thin glass this instrument is by no means adapted. For this purpose a good writing diamond is requisite, which should be brought to a very fine *scratching* point only. To cut the discs of thin glass for covering objects, strike a circle of the required dimensions on a piece of card-board, and cut it out with a penknife. Place this pattern over the glass, and pass the writing diamond around the edge of the circle, until it has scratched it. A mere scratch is sufficient to enable the operator easily

to remove the surrounding portions. This is said to be Mr. C. M. Topping's plan.

Diamonds of good quality for these purposes may be obtained from Mr. Ellis, Goswell Street Road. The price of a good cutting diamond, for ordinary purposes, is about fourteen shillings, that of a scratching one, a guinea.

The Microscopical Society of London possesses a machine for cutting glass for slides of any desired size, which may be made use of by its members, on application to the Secretary. Mr. Drake of Jermyn Street is also in possession of a similar instrument, and supplies strips of glass to order.

XVI.—ON THE DEVELOPMENT OF THE ANIMAL TISSUES.*

By Professor Müller.

MODERN Vegetable Physiologists have for some time arrived at the result that the different tissues of plants, such as cellular tissue, woody fibre, ducts, and spiral vessels, are all originally developed from cells. The mode of formation of these cells has been explained by Schleiden.† He has shown that they are produced from the "nuclei" of Robert Brown, and hence he calls these bodies "*cytoblasts*" [*κυτος* a cell, *βλαστος* a germen]. The cytoblast is generally of a yellowish colour, and internally of a granular structure. In its interior Schleiden has detected a second nucleus (nucleolus), called by him the nucleus corpuscle, which sometimes resembles a mere spot, at other times a hollow globule. The cytoblasts are developed in a mass of mucous granules contained within previously existing cells. As soon as they have attained their full size, a delicate transparent vesicle rises upon the surface of each. This is the young cell, which at first bears the same relation to the flat nucleus as the watch-glass bears to a watch. When the cell has increased in size, the cytoblast appears merely as a solid body included in the wall of the cell. The layer which now covers the cytoblast on the side towards the interior of the cell is extremely delicate—indeed, seldom to be recognized by the eye—and it soon becomes wholly absorbed, while the cytoblast itself disappears at the same time. The newly developed cells lie free in the cavity of the parent cell, and, as they grow and exert reciprocal pressure against each other, assume the polyhedral form.

* From Müller's *Elements of Physiology*, translated by Dr. Baly, p. 1641.

† Müller's *Archives*, 1838, p. 137.

The following are the more important discoveries of Schwann,* respecting the cells of animals, and the agreement of animals and plants in their ultimate structure.

In the chorda dorsalis, the cellular structure of which I had myself pointed out long since, Schwann first discovered the nuclei or cytoblasts. Each cell of the chorda dorsalis of *Pelobates fuscus* has its disc-like cytoblast lying at the inner surface of the wall of the cell; and in this nucleus there is seen one, rarely two or three, clearly defined spots. In the cavity of the cells young cells are developed, as in plants.

Cartilages also are, according to Schwann's observations, composed entirely of cells, when first formed. The cartilaginous branchial rays of fishes at their apex are composed of small polyhedral cells, lying in close contact with each other, and having very thin walls. These cells have rounded granular nuclei. Towards the middle of the branchial ray, the septa between the cavities of the different cells formed by their walls, gradually become thicker. Nearer to the root or base of the branchial ray, the walls of the contiguous cells can no longer be distinguished from each other, and the mass appears to be formed of a homogeneous substance containing small cavities; but around some of the cavities a circular line can be distinguished, which indicates the boundary of the wall of the cell, and proves that the whole mass is not formed by the thickened walls of the cells, but that a real intercellular substance also exists. Even while the walls of the cells are still in contact with each other this intercellular substance is present, at that time appearing here and there like a triangular space between three contiguous cells. In this form of cartilage the process of development consists partly in the thickening of the walls of the cells, and partly in the production of an intercellular substance. In higher vertebrate animals the thickening of the walls of the cells is not observed, and the principal mass of the future cartilage appears to be formed by the intercellular substance, in which the cells, with the younger cells within them, are included. The development of cells in the manner of the cells of plants, has been observed by Schwann in the branchial cartilages of *Pelobates fuscus*, in which some cells contain mere nuclei; others, nuclei with small cells developed upon them, and scarcely larger than themselves; others, again, larger fully formed cells. So that here all

* Foriep's Notizen, 1838, Nos. 91, 102, 112. Schwann *Microscopische Untersuchungen über die Ueber-einstimmung in der Structur und dem Wachsthum der Thiere und Pflanzen*, Berlin, 1838. [A review of this work, with a copious abstract of its contents, is contained in the 9th volume of the *British and Foreign Medical Review*.]

the stages of the development of a cell are present. The process of the development of cartilage seems to be independent of blood-vessels, and to be wholly analogous to the process of growth in vegetable tissues : how the canals radiating from the corpuscles of ossified bone are developed is not known. Two hypotheses are proposed by Schwann. If the osseous corpuscles are the cavities of cells, the thickened walls of which have coalesced with each other and with the intercellular substance, so as to form the mass of the cartilage of the bone, then the radiating canaliculi may be regarded as canals extending from the cavities of the cells through their thickened walls, and would be analogous to the pore-like canals of some vegetable cells. But if the osseous corpuscles are the cells themselves, and not merely their cavities, the whole substance between the corpuscles being intercellular substance ; in this case the canaliculi will probably be radiating prolongations of the cells extending into the intercellular substance. According to the latter view, which Schwann regards as the more probable, the canaliculi would correspond to the processes given off from some cells of plants.

Besides the formation of young cells in the cavities of previously existing cells, Schwann has observed their development in the exterior of other cells in a structureless substance, the *cytoblastema*. In this case, also, the nucleus generally appears to be first formed, and the cell to be afterwards developed around it. In many animal tissues, the new cells are formed on the exterior of the earlier cells. In the one case the cytoblastema exists in the interior of the cells already existing ; in the other it is external to them.

Schwann arranges the tissues of the animal organism, according to the mode of their development, in five classes :—

- I. Isolated independent cells, which either float free in a fluid, or if deposited, in contact with each other, are still unconnected and moveable.
- II. Independent cells, arranged so as to form a continuous membrane.
- III. Tissues formed of cells, the walls of which have coalesced, while their cavities remain distinct.
- IV. Fibre cells.—Cells which have become elongated in different directions, and resolved into bundles of fibres.
- V. Cells, both the walls and the cavities of which have coalesced, so as to form tubes.

To the *first class* belong the corpuscles of the blood. The vesicular nature of these bodies was observed by C. H. Schultz. Their nucleus,

as Schwann remarks, remains attached to the inner surface of their membranous parietes, when they are rendered turgid by the action of water. The red colouring matter of the corpuscles is to be regarded as the contents of the cells. The lymph corpuscles, the globules of mucus, and those of pus, belong to the same class. They are all nucleated cells.

To the *second class* belong the horny tissues, the pigment membranes, and the tissue of the crystalline lens.

1. *Epithelium*.—Generally composed of round cells, to the inner surface of whose parietes a nucleus containing one or two nuclei is attached. When united into a membrane, they are polyhedral. In the epithelium of the skin of a frog, Schwann saw two nuclei in one cell, and also a nucleated epithelium cell within another larger cell; a fact which Henle has not observed in Mammalia. The epithelium cells, at first globular, undergo modifications of form in one or two directions. Either they acquire the form of perpendicular cylinders, as in the epithelium of the intestinal mucous membrane, described by Henle; or they become flattened into laminae, which have the nucleus in the middle of one surface, and which sometimes are elongated or riband-shaped, as in the epithelium of blood-vessels according to Henle. In the latter case, it is observed, that the young cells are found beneath the older ones, and are at first globular, but become more and more flattened as they approach the free surface of the epithelium.

2. *Pigment cells*.—These have a nucleus at one part of their parietes, which produces the well-known white spot in the middle of some pigment cells. The nucleus has usually one or two nucleoli. Many pigment cells in the progress of their growth, send out hollow fibre-like processes in different directions, so as to become stellate cells.

3. *Nails*.—The nail of a fully developed human foetus consists of laminae lying horizontally one upon the other. These laminae become less and less distinct at the inferior surface of the nail, in proportion as the part examined is nearer to the root of the nail which is inserted into the fold of the skin of the finger; and the posterior half of this portion of the nail presents nothing of a laminated structure, but consists merely of polyhedral cells, with distinct nuclei. Laminae of the nail treated with acetic acid, separate into scales, in which an indistinct nucleus can in very rare cases be observed. The polyhedral cells of the root of the nail must become flattened into these scales, and the nail ought consequently to become thinner towards its free margin. This is probably prevented by the formation of laminae of epithelium,

at the under surface of the nail. The horny tissue of the hoofs of animals, also consists in the fœtus entirely of cells.

4. *Feathers*.—The medullary substance of feathers is composed of polyhedral cells. In the young feather, a nucleus is visible in the wall of each of these cells. The cells are developed around small nuclei, which lie in great number in a finely granular matter. This formation of new cells takes place, not in old parent cells, but near the surface of the vascular matrix of the feather, which affords the cytoblastema. Some of the nuclei contain nucleoli. The fibres of the cortical part of the shaft of the feather are produced from large band-like epithelium cells, which contain nuclei and nucleoli. These cells become resolved into several fibres, while all trace of the cell disappears. The barbs of the feathers are themselves miniature feathers; the secondary shafts have the same structure as the main shaft, while the secondary barbs or barbules in their turn consist at first of nucleated cells applied to each other by their edges.

5. *The Crystalline lens*.—The fibres of the crystalline lens are developed from the cells first observed by Werneck. In the lens of a chick after eight days' incubation there are as yet no fibres, but merely pale round cells, some of which contain a nucleus. In lenses further developed, some of the larger cells contain one or two smaller cells in their interior. In embryo pigs, measuring three and a half inches in length, the greater part of the fibres of the lens is already perfect; but a part is still not completely formed; and there are besides many round cells which are about to undergo their metamorphosis. The perfect fibres compose a nucleus in the centre of the lens. The next fibres are seen to be tabular prolongations of globular cells. The dentated orders of these cells, like those of some vegetable cells, are formed subsequently.

(To be continued.)

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

Decaisne on the Structural development of the Generative System of Viscum album.—The male flowers may be detected almost a year before anthesis. At first the anthers are only distinguishable from the adjacent green periantheal expansions by their want of colour, they being otherwise composed of the same kind of cells. At a later period numerous spaces, filled with a mucous fluid, are seen, from which mucus other cells, larger than the adjacent ones, and kept together by a transparent

substance, are formed; these latter cells represent the mother-cells in which the pollen is generated. Besides these the antheroid mass has at this time two descriptions of cells; on one side the primordial colourless cells; on the other, grey or yellow cells, generally provided with a nucleus. The mother-cells soon become dark, as they fill with numerous granules, in which one or two granular nuclei appear. These granules coalesce in the centre of the cell, so that a transparent space is left around them; they then disappear, leaving the nuclei in the centre. These nuclei are separated from each other at first by a fluid, which afterwards becomes firm, forming distinct walls between them, during this time also the walls of the mother-cells have been getting thicker; the nuclei continue to increase in size, become of a spherical form, and are surrounded with a yellowish mamellated case; as the walls of the mother cells and the separating membranes disappear, they become free, and produce perfect granules of pollen. No spiral cells or fibrous structure are developed in the endothecium. In the female flower, three months after impregnation, the nucleus first appears as a very small conical body, lying at the bottom of the ovarial cavity, accompanied by one or two small club-shaped filaments, which are abortive nuclei. The nucleus grows very rapidly, and has at its point a small spot indicating the embryo, which is developed like the embryo of other dicotyledons, there being, however, no quintine or embryo-sac. The only covering is the remains of the nucleus or nuclear-sac, which increases in size, becomes firmer, and forms a green-coloured perisperm.

Mohl on the Structure of the Stem of Isoetes lacustris.—Whilst the upper flattened leaf-covered surface of the spheroidal or bulb-like stem presents nothing peculiar in appearance, the under one is seen to be traversed by a furrow or slit, which extends to both sides, and as high up as the insertion of the leaves; so that the stem consists of two spherical or bulb-like masses, connected by a commissure. The radicles which are found in this furrow are not developed like those of other abbreviated stems (bulbs, premorse roots, stems of other cryptogamia and monocotyledons) in regular succession, so that the radicles seated on the lowest portion are the oldest, but the new ones break through the whole length of the furrow in its deepest part, they are therefore placed in a semilunar manner, the points of the figure which they represent pointing to the insertion of the leaves. Probably every year the stem loses an external coat, whilst a new layer is formed in the centre. From the very minute woody system of the stem, a great quantity of delicate unbranched and non-anastomosing vascular bundles are found radiating. From the upper ones there proceeds an arched bundle, both to the upper and under surface of each leaf; from the lower there passes a bundle to each radicular filament. The whole white mass of the spherical stem consists of parenchymatous cells arranged in rows parallel with the vascular bundles, filled with amyllum, and between which run large intercellular passages. The external cells lie more parallel with the surface of the sphere, contain very little, or even no amyllum, and form a peculiar, though not very distinctly defined layer,

from which the barky covering of the radicles is formed. This layer fills the base of the deep indenting furrow. In the cells of the dead layer, the amyllum disappears, and a brown colour is produced. The small central woody system is composed of short, roundish, spiral, and annular cells with larger intercellular spaces and passages, amongst which only a few plain cells, having thin walls, are distributed. The radiating vascular bundles consist of delicate annular and spiral vessels, and a few elongated cells having delicate walls; at the junction of them with the woody system, the vessels become shortly articulated.

On Entozoa and Parasites.—(Reference to the following, p. 239, et seq. Valentin's Repertorium, 1841.) *Nivet* on Cysticerci. *Hüring* on a case of *Cysticercus cellulosa* in the conjunctiva of a girl seven years of age. *Michéa* on two cases of *Acephalocysts* in the brain. *Cruveilhier* on *Acephalocysts* of the liver, and especially of the spleen. *Weitenkampf* on the passage of *Blasenschwänzen* (?) with the urine. *Wymann* on *Filaria* in the bronchi of a sheep. *Lee* on *Filaria papillosa* in the anterior chamber of the eye of the horse. *Müller* on *Distoma* in the hollow of the spinal marrow of the Fœtus. *Mæsson* on a worm found in the bubo of a woman thirty-six years of age. *Skripitzin* on *Pulex penetrans*. *Brunzlow* on the *Acarus* of the Itch.

Will on the Compound Eyes of Insects and Crustacea. (Continued from page 185, Vol. I.)—Behind the cornea is a layer of minute conical or pyramidal-shaped crystalline bodies, one of which is placed behind each corneal facet, in such a direction that its acuminate extremity points to the interior of the eye. Connected with this extremity is a nervous fibril given off by the optic ganglia, which spreads itself out in a cup-shaped manner, surrounds the whole of the crystalline body, with the exception of its base, and then either immediately passes to the edges of the facets of the cornea, or to a thin membrane between the crystalline bodies and the cornea. A great deal of pigment is found between the crystalline bodies, especially near their points. No trachea could be discovered in the layer of pigment. Amongst the *Crustacea*, *Palæmon serratus* has four-cornered facets and crystalline bodies. The latter, when pressed, divide longitudinally into four portions, the places of separation being indicated in the perfect bodies by the presence of longitudinal lines. Between the cornea and the convex bases of the crystalline bodies, is a transparent layer, provided with pigment, and of the thickness of $\frac{1}{100}$ th to $\frac{1}{90}$ th of a line. This layer can easily be separated from the bodies just alluded to, and behind which latter is a soft cylindrical mass of about half their length, which envelopes their posterior quarter in a cup-like manner. The whole mass is very thickly studded with dark pigment. To each crystalline body runs a cylindrical cord, given off by the ganglia of the optic nerves, and which consists of a tube enveloped in a sheath to the point where this cord separates from the ganglion; the sheath is constricted and surrounded with a great quantity of pigment. From the transparent masses behind the crystalline bodies, a basin-shaped expansion arises, which reaches anteriorly

only to the facets. *Galathea strigosa*, *Astacus fluviatilis*, and *Astacus marinus*, shew the same structure. In *Galathea*, the substance between the cornea and crystalline bodies is thinner, and the masses appended to the posterior portions of the latter are shorter than ordinary. In *Astacus fluviatilis*, a delicate margin exists around the crystalline bodies, and no tube could be discovered within the nervous cord. In *Astacus marinus*, the transparent masses behind the bodies are very long; whilst in *Pasiphaea squinado* and *Palinurus locusta*, none could be found. In *Squilla mantis*, the nervous fibril has a brown coloured sheath, and is dilated anteriorly. In all the *Coleoptera* which were examined, as in *Melolontha vulgaris*, *M. fullo*, *Dytiscus marginalis*, *Staphylinus erythropterus*, *Calosoma sycophanta*, and *Cetonia aurata*, the crystalline bodies are conical, and appear, with the exception of *Cetonia aurata*, to lie immediately upon the cornea. The transparent masses behind these bodies are also wanting. By gentle pressure, the crystalline cones split into an indefinite number of prisms, and have a narrow margin, which is probably caused by the presence of an envelope or case. In *Melolontha vulgaris*, *Cetonia aurata*, and *Calosoma sycophanta*, at the points, a small granule was seen, which probably belongs to the optic nerves. The nervous fibril is thicker (in *Cetonia aurata*, three or four times thicker) at the place where it is given off by the ganglia than the rest of the nervous cord; and in this species the bason-shaped expansion before alluded to, reaches to the facets, and the cones are surrounded with much pigment. In the *Orthoptera* the crystalline bodies are also conical, and the optic nerve has a dark tube in the centre. The pigment, like in the *Coleoptera*, leaves round openings in the cornea, free of any. In *Gryllotalpa*, the crystalline bodies imbedded in the dark-brown pigment are very small; and in *Locusta viridissima*, their basal surfaces have an hexagonal-form, with blunt points, and the nervous fibril has a clear tube within it. *Mantis religiosa* has very long hexangular crystalline bodies immediately beneath the cornea and very closely packed together, their points alone being provided with pigment; the bason-shaped expansion of the nervous fibril, which latter possesses a sheath and clear tube, is green. In the *Hymenoptera*, *Vespa crabro* has a thin transparant membrane next the cornea, which has divisions equal in number to the facets of the cornea, and which keeps the crystalline bodies connected together when separated from this latter covering. The bases of these conical bodies are placed in hexagonal divisions of bright yellow pigment. The comparatively very thick but uniformly cylindrical nervous fibril has everywhere dark pigment, and is provided with a delicate and clear tube; the latter, with the pigment belonging to it, ceases at the point of the cone. The inner tube surrounds the cone in a bason-like manner. *Apis mellifica* has also short conical bodies, with slightly convex bases enveloped in dark red pigment; its nervous fibre is similar to that of *Vespa*. *Bombus* is the same.

(To be continued.)

[From *Müller's Archives*, 1841.]

Valentin on an Entozoon in the Blood of Salmo fario.—In the blood obtained from the commencement of the abdominal aorta, in a specimen of *Salmo fario*, some dark globules, similar to the round cells of pigment were observed amongst the proper blood-globules. They moved actively, generally tremulously, but yet were distinctly locomotive. After regarding them some time, a transparent tail was observed laterally. Gradually an animal, elongated in form, disenveloped itself, which moved about actively and constantly. Its motion was produced by means of from one to three variable and semi-lateral appendages, by which it rolled in a circular direction. The anterior and posterior portions of the creature were bright and transparent, the medial contained numerous dark granules, probably molecules of pigment derived from the material it had eaten. When the creature was rolled up, it appeared as if these molecules were enveloped in a sort of case derived from the body, which was transparent, and at length club-shaped. Fig. *a*, (Pl. III. Div. 4.) represents the primary globule seen; Figs. *b*, *c*, *d*, various conditions of the globule, showing the tail unrolling; *e*, a globule, in which the molecules appear as if enclosed in special portions of the body, which become club-shaped; *f*, this club-shaped receptacle ideally represented; *g* to *m*, different forms of fully developed animals, and which no doubt belong to the old genus *Proteus*, or the new genus *Amœba* of Ehrenberg. It is probably a new species, as it does not agree with any already described and drawn by the last-mentioned author. Of its internal and delicate organization, nothing with certainty could be made out, as it only measured from 0.0003 to 0.0005 parts of an inch long.

Sometimes it appeared to have a round aperture anteriorly, and the tail striated, as is represented at *k*. The variable appendages or projections always appeared under the microscope, to be as they are drawn, on the right side. Perhaps the club-shaped receptacles before alluded to, were of the same or similar proportions. It was at first a matter of doubt whether this creature really belonged to the blood, and the whole fish was therefore examined; but no where else could it be detected; not a trace of this Infusorial Entozoon could elsewhere be found, save in the favourite place of microscopic intestinal worms, the fourth ventricle, in which was discovered a single specimen. On the other hand, they were so plentiful in the blood, that a single drop always contained one, often ten, and sometimes more. In the effused blood they remained alive between 16 and 18 hours. This fluid itself presented otherwise nothing abnormal, and which fact deserves to be borne in mind. *Ascaris obtuso-candata* zeder was found in abundance in this *Salmo*, but no other intestinal worm.—*Heft. 5*, 1841.

[From the *Annales des Sciences Naturelles*, 1841.]

Desmazierès on Microthyrium Microscopicum.—This minute and very curious production (Lichen) grows on the upper surface of dry and half

decomposed leaves of the Chesnut. M. Roberge, to whom I am indebted for a sufficient number of specimens to illustrate my work on Cryptogamia, observed it also on the leaves of the oak. It is scattered or arranged in groups, and at those parts where several meet together, they appear of a greyish-brown colour, while the rest of the leaf is of a reddish tint. On these irregular and more or less extensive patches, a lens brings into view small discs or perithecia, depressed in the centre, where a small elevation is to be observed. These discs, of which the diameter scarcely attains $\frac{1}{4}$ th of a millimetre, are blackish, slightly shining, of a leaden hue, especially around the papilla, or elevation. They are readily and easily detached entire from their support, and, submitted to the microscope, they are found to be composed of a very delicate semi-diaphanous membrane, furnished with a network of opaque fibrillæ, radiating from the centre to the circumference, and traversed by other fibrillæ, crossing them exactly similar to the delicate tissue in the spider's web; in the centre is also found an opening, which corresponds to the elevation above alluded to. Beneath this small membraniform disc the thecæ are found, which are fixed, concealed, and circularly arranged, their base corresponding to the opening of the disc. These thecæ, devoid of paraphysa, are in a mass, and sometimes in a slight degree swollen towards the middle of their length, which does not exceed the $\frac{1}{20}$ th of a millimetre. The enclosed sporidia are oblong, slightly fusiform, straight or a little curved, about $\frac{1}{80}$ th of a millimetre in length, and furnished with three sufficiently distinct divisions.

The characters of this new genus and species, as given by Desmazières, are :—

MICROTHYRIUM. Desm. Perithecium simplex, superficiale, membranaceum, adpressum, scutiforme, centro perforatum, obtegens ascos fixos subclavatos.

M. microscopicum. Desm. Pl. Crypt. édit. 1, No. 1092; édit. 2, No. 492.—*M. epiphyllum*; maculis magnis, irregularibus, fusco-cinerascentibus; peritheciiis sparsis, minutissimis, tenuissimis, nigris, subnitidis, papillatis; ascis clavatis; sporidiis septatis, oblongis, subfusiformibus.

Habitat.—In foliis exsiccatis Fagi, Castaneæ et Quercus. Autumno.—*March*, p. 138.

Explanation of the Figures.

PLATE III, Div. 2, Fig. 1. *a*, Membraneous Perithecium of *Microthyrium microscopicum*, seen with a power of 260 diameters. *b*, Vertical Section. *c*, Thecæ, concealed and arranged in a circular manner beneath the perithecium. *d*, Oblong fusiform sporidia, usually furnished with three rather distinct divisions.

Desmazières on the differential characters of Sphæria insidiosa and S. caulium.—These two Lichens are so nearly allied in external characters, as to render it almost impossible to decide upon each species without the aid of microscopic investigation. The differences detailed by Desmazières are the following :—The membrane of the theca of our *Sphæria insidiosa* is so thin and transparent, that no idea would be entertained of its existence, were it not for the sporidia it contains. These spori-

dia, of an olive colour, are oblong, above $\frac{1}{50}$ th of a millimetre, slightly curved, and provided with from 3 to 5 partitions, obtuse at their extremities, where a filiform, transparent, short and sharp appendage may be seen.—The theca of *Sphæria caulium*, on the contrary, is longer and very apparent; its sporidia, of a pale greenish colour, measure $\frac{1}{25}$ th of a millimetre; they are slightly curved, provided with from 5 to 7 partitions, and pointed at the extremities, to which no appendage is attached.—*March*, p. 145.

Explanation of the Figures.

PLATE III. Div. 3. *a*, Thecæ and sporidia of *Sphæria caulium* magnified 500 times.
b, Thecæ and sporidia of *S. insidiosa*, magnified likewise 500 times.

Montagne on the use of the Compressor in the examination of Lichens.—As an essential desideratum to a good achromatic microscope, I will mention the instrument called *Compressorium*, brought to perfection by M. Schiek of Berlin. I cannot too strongly recommend its employment to those who are occupied with researches on the structure of certain parts of Cryptogamic plants, and in particular, the thecæ of Lichens. It would be almost impossible, without its assistance, to verify the facts I have recorded.—*March*, p. 147.

Dufour on Anatomical and Physiological studies of a species of Musca, with the view of illustrating the History of Metamorphoses, and the Pretended Circulation of Insects.—This paper is one of some length; but the author, from his dissections, experiments, and reasonings, concludes, that the existence of an aëriferous vascular system adapted to convey the physiological benefits of respiration to all the organs and tissues, is incompatible with the presence of a circulating humour. He is satisfied that the latter does not exist in insects provided with tracheæ, and that the organ which has been supposed to perform this function, is merely rudimentary, bearing some resemblance to the heart of the Arachnides; in fact, an obsolete heart, an organ deprived of every well-determined physiological attribute, and perhaps a mere elementary tissue.—*July*, 1841, p. 5.

[From the *Comptes Rendus*, 1841.]

Biot on Achromatic Lenses with multiple Glasses in the Eye-piece.—This communication, which is here only given in abstract, relates especially to Telescopes, and is only quoted in this place, as a reference for opticians, and those interested in instruments used for astronomical purposes.—*6th Dec.* 1841, p. 1039.

Joly on Isaura cycladoïdes.—The author at the termination of his Memoir arrives at the following results:—1, The *Isaura cycladoïdes* constitutes a new genus of the *Crustacea Branchiopoda*, near to *Apus*, *Limnadus*, and *Cyzicus* of M. Audouin;—2, In form, structure, and mode

of growth of its shell, this genus constitutes a natural connecting link of the *Crustacea* with the *Acephalous Mollusca*; in the rest of its structure, it is related to the *Cirrhypoda*, which come after the *Crustacea*.—3, The *Isaura cycladoïdes* does not acquire its bivalve shell or definitive form until after a series of changes, during which it assumes successively the form of *Artemia*, *Branchipus*, and still more *Apus* in a young state; then, that of *Daphnia*, *Lyncia*, *Cypris*, *Limnacus*, and *Cyzicus* arrived at the adult state;—4, Although this Branchiopod undergoes very frequent changes, its shell, far from being caducous, as that of all other Crustaceans with a bivalve shell, remains during the entire life of the animal, and resembles also in this particular the coverings of the Mollusca;—5, It enlarges in the same manner as the nacreous portion of the shell of the Malacozoaires, viz., by the addition of successive larger, and more internal layers, the thickened margins of which form at its external surface true striated marks of growth;—6, These layers may be readily separated from each other after a period of 24 hours' maceration in caustic potass;—7, The *Isaura cycladoïdes* is provided with separate sexes. The male is at once distinguished from the female by the presence of two pairs of appendages, situated in front of the abdominal feet, and furnished at their free extremities with a kind of three-fingered apparatus (*griffes*), especially adapted to retain the female during copulation;—8, This animal habitually swims on the abdomen, that is to say, the reverse of other Branchiopodous Crustaceans, and particularly *Apus* and *Limnacus*, to both of which it is nearly allied;—9, Its eggs, similar to those of *Apus*, *Limnacus*, and *Branchipus*, appear to possess the power of supporting desiccation for a long period, without in the mean time losing the power of germination.—6th Dec. 1841, p. 1068.

Brogniart presented to the Academy, in the name of the author, M. H. R. Göppert, a Memoir on the Anatomical Structure of *Conifera*.—6th Dec. 1841, p. 1071.

Great Prize in Physical Sciences—Proposed in the year 1837 for 1839, and submitted again for 1843. The Academy proposed as the subject of the Great Prize in Physical Sciences, at the Public Sitting in 1839, the following question:—

“Determine, by precise experiment, what is the succession of chemical, physical, and organic changes which take place in the egg during the development of the foetus in Birds and Batrachians.

“The candidates are required to render an account of the relations of the egg with the natural *milieu ambiant*; and to examine, by direct experiment, the influence of artificial changes on the temperature and chemical composition of this *milieu*.”

“Within the last few years, several observers have directed attention to, and produced some profound researches on the development of the chick in the egg; and have extended their inquiries to the development of the foetus in other oviparous animals. Generally speaking, their examinations have principally been conducted in an anatomical

point of view. Some, however, have considered the numerous chemical questions full of interest which this examination is capable of resolving.

“Thus, supposing the chemical analysis of the egg be made at the moment when it is laid, with a view to examine the elements which it absorbs from the air, or evolves during the period of its development—when the losses and absorptions of water which it sustains have been determined, and when the whole of the necessary elements have been reunited—required the consideration of the chemical processes employed by nature for the conversion of the materials of the egg into the very different products composing the young animal.

“In applying to the consideration of this question the actual method of organic analysis, the degree of precision which they have arrived at must be given.

“But, if it be possible, it is desirable to confirm, by ordinary chemical means, the accounts given of the changes which take place in the proportions of carbon, hydrogen, oxygen, and azote; and of those relating to the changes of the mineral products which enter into the composition of the egg; and further, on the other hand, to examine alterations not less important, and capable only of being brought to light by the assistance of the microscope.

“The Academy desire that, far from *endeavouring to confirm*, in the several parts of the egg, the presence of the immediate principles which analysis furnishes, the authors should direct all their efforts, with the assistance of the microscope, to the state in which these immediate principles are there met with.

“Results of a most interesting and important character are anticipated from this chemical and microscopical examination of the phenomena of the production or development of organs.

“Independent of the study of the development of the fœtus in these normal conditions, it is requisite to record the changes that the modifications of temperature, or the nature of the medium in which this development is effected produce. The candidates are further required to investigate the incubation of the eggs of birds in several gases; and in the case of Batrachians, their development in water more or less impregnated with salts, and more or less aërated.

“The prize awarded will be a gold medal of the value of *Three Thousand Francs*. The memoirs must be forwarded to the Secretary of the Academy before the first of April, 1843. It is requisite for the authors to write their names in a sealed packet, which will not be opened until the Prize Memoir is decided upon.”—*28th Dec. 1841, p. 1181.*

Coste on Fresh-water Polypi.—The researches of the author on these animals are of the greatest importance; inasmuch as, after having entered upon the complicated organization of the various species of *Polypi*, the general binary disposition of their organs, the position of their nervous system, and after considering, also, that they have mouths, in many respects analogous to those of the *Mollusca*, and that, like them, they produce the envelope which protects them; and when

to these are added certain special facts which the *Cristatella* present, as, for example, having a foot which is everywhere contractile, and their secreting, like the *Gasteropoda*, a copious viscid matter; we shall be led not only to associate them with the class of the *Mollusca*, but likewise to introduce along with them all the animals which are farther down in the scale. Before, however, maintaining this as an irrefragably established fact, we shall request another opportunity of explaining some additional results.

[From *Annals of Natural History*, April 1842.]

Mr. Ralfs on four new Species of Desmidium.—Mr. Ralfs observes that this natural genus is not well defined, either in Agardh's *Conspicua critica Diatomacearum*, or in any of our British works. Its best distinctive characters seem to consist in the crenated appearance of its filaments, which is least evident in *D. mucosum*. These filaments, which are generally twisted in a regular manner, are of a pale green colour, simple, fragile, short and straight. The species are found during a great part of the year, in clear shallow pools, or in old peat bogs; the filaments being scattered in loose bundles in the water, or forming a thin gelatinous fleece at the bottom of the pool. The species ascertained by Mr. Ralfs are named by him *D. cylindricum*, *mucosum*, *Swartzii*, and *Borreri*. (*Report of Botanical Society of Edinburgh.*)

[However indefinitely characterised may be this Genus in Agardh and our British works, we think it perfectly satisfactorily determined in the great work of Ehrenberg, in which it will also be seen that *Desmidium Swartzii* was determined forty years ago, and that *D. cylindricum*, first observed by Greville in 1827, more properly belongs to the genus *Arthrodesmus*.]

Mr. Yarrell on Mucor observed by Col. Montagu growing in the Air Cells of a Bird.—In addition to the instances quoted in the 8th volume of the *Annals*, page 229, of the growth of cryptogamous plants in the bronchial tube of a Flamingo, and on the internal surface of the air cells of an Eider duck, Mr. Yarrell refers to another example mentioned by Col. Montagu, who says, "The cause of death appeared to be in the lungs and in the membrane that separates them from the other viscera; this last was much thickened, and all the cavity within was covered with mucor or blue mould. It is a most curious circumstance to find this vegetable production growing within a living animal, and shows that where air is pervious, mould will be found to obtain, if it meets with sufficient moisture and a place congenial to vegetation. Now the fact is that the part on which this vegetable was growing was decayed, and had no longer in itself a living principle; the dead part, therefore, became the proper pabulum of the invisible seeds of the mucor transmitted by the air in respiration. It would indeed be impossible for such to vegetate in a living body, being incompatible with vitality, and we may be assured that decay must take place before the minute vegetable can make a lodgement to aid in the great change of decomposition."

Buckland on Fossil Remains of Minute Organisms.—Mr. Tennant has informed me, that a microscopic examination of the Stonesfield slate by Mr. Darker, and of other oolites, has recently shown them to be crowded with remains of organized bodies, invisible to the naked eye. I learn also from Mr. Tennant, that abundant microscopic organic remains have recently been discovered in thin slices of certain beds of carboniferous limestone from Derbyshire: similar results may shortly be expected from a microscopic examination of the chert of the same formation. We must not, however, be tempted by these discoveries to rush suddenly to the rash and unwarranted conclusion, that all limestone and all siliceous is of organic origin. It has not yet been shown, that the granules resembling the roe of fishes, which give character to the oolitic formation, and abound occasionally in limestone of the triassic carboniferous and Silurian series, have any necessary connexion with organic bodies. We may, with Ehrenberg, admit and admire the extent of microscopic chambered cells and Infusoria which he has shown so largely to pervade the chalk and other calcareous and siliceous formations, without claiming an exclusively animal origin for the native substance of all rocks in which lime or siliceous is the principal ingredient.—(*From Dr. Buckland's Address to the Geological Society.*)

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

March 16th, 1841.—Professor Lindley in the Chair.

MR. EDWIN J. QUEKETT made some observations upon a peculiar woody tissue which he had detected in a specimen of Coal. The method adopted in the present instance to discover the structure, was by taking from the specimen, which exhibited a surface like charcoal on one of its sides, some minute scrapings, by the aid of a sharp knife, and immersing them in Canada Balsam. By this means the woody fibres became more or less separated, and certain of these fibres then appeared as if containing some resinous matter, which had preserved their original character, appearing perfect as in recent wood. The structure of the woody fibres was evidently that of the coniferous character; where there are more than one row of dots on each fibre, these dots appeared to be formed by two spirals wound in the interior in different directions, the turns of each connected at intervals by longitudinal bands, thereby leaving a transparent space by such arrangement.

Mr. Quekett also exhibited a silicified specimen of coniferous wood (said to be from Greenland), which presented the like structure. Nothing analogous, he believed, had hitherto been detected in recent woods.

Mr. Busk exhibited some parasitic insects which he had received from South America: they were sent to him in a letter, and were still alive. They are said to be highly injurious to horned cattle, not only producing destructive skin diseases, but often occasioning caries and necrosis of the bones, by their burrowing into the joints.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

December 2, 1841.—*Mr. Bergin in the Chair.*

The Secretary having read the minutes of the former meeting, various matters of private business were brought before the Society.

Mr. Allman presented specimens of *Trichina spiralis*, a rare and remarkable Entozoon found in human muscle: the muscle was a portion of the Pectoralis major of a man who had died of fever. Mr. Bergin mentioned a statement made by Mr. J. Quekett, that Porpoises taken in estuaries and rivers abound in parasites, and supposed that they might have been driven to the shallows in order to get rid of them; a few days since, however, he had procured a porpoise, captured in the open bay of Dublin, and found its bronchial tubes filled with specimens of *Strongylus*.*

January 6, 1842.—*T. F. Bergin, Esq., in the Chair.*

After the transaction of private business, Mr. Mackay laid before the Society a specimen of *Equisetum elongatum* new to the British Flora:—discovered in Colin-Glen, near Belfast, by Mr. Whitlaw, and figured by Schlechtendahl from the Cape of Good Hope.

Mr. Yeates presented to the Society a Microscope Case, containing several instruments necessary in microscopic investigations.

Mr. Bergin read some notes on Ehrenberg's late interesting communication to the Berlin Academy, on the important part which microscopic organization plays in the choking up of certain harbours.† (See p. 68.)

Mr. Callwell presented specimens, prepared in balsam, of *Trichina spiralis* separated from the muscle that had contained them.

Mr. Andrews exhibited specimens of *Plumularia cristata* from Kerry County in the west of Ireland.

Microscopical Memoranda.

On the occurrence of Tricocephalus Affinis in the Tonsil of a Man.—

At a post-mortem examination of James Flack, of the 75th Regiment, at the Army General Hospital, Fort Pitt, Chatham, one specimen of this Entozoon was found imbedded on cutting into the left tonsil, which was considerably enlarged and in a gangrenous sloughy condition. This species, first described by Rudolphi, has not, according to this observer, been hitherto discovered in the human subject. On submitting the specimen to examination under the Microscope, it was found to be a female. It is preserved in the Museum of Fort Pitt.—*Editor.*

Distinguishing character of Algæ and Animalcules.—The active motions and contractions in plants and their parts, especially in Algæ, ought not

* See Mr. Quekett's remarks, Vol. I, p. 125 of this Journal.

† Ehrenberg's communication will be found in the Microscopic Journal, Vol. I, p. 162.

to give rise to the supposition of an animal nature, even when they are called infusorial or animal motions. Internal nutritive organs, and a definite oval aperture for the reception of solid substances, which may be demonstrated, distinguish the apparently most simple animal from plants. Ehrenberg has never seen, in his numerous experiments, the motive Algæ seeds take up the smallest quantity of solid nutriment; and thus the fruit strewing Alga may be distinguished from the *Monades* which swarm round it in the same manner, as the tree from the bird. —Ehrenberg in *Poggendorff's Annalen. Taylor's Scient. Mem. Vol. I. p. 566.*

Gulliver on the Ova of the Distoma Hepaticum.—The physiology of the common Liver Fluke is extremely interesting, on account of the connection which this parasite has with a very frequent and fatal disease of that useful animal, the sheep. "If we obtain," says Mr. G., "from the bile-ducts of the sheep, some of the larger ova of the Entozoon, and subject them to careful examination, it will be found that the cyst of the ovum presents a very clear outline, the continuity of which is uninterrupted, except at one end, where a well-marked *operculum* may be seen. The size of these ova differs considerably; their average length is about $\frac{1}{250}$ th of an inch, and their breadth $\frac{1}{400}$ th. The interior of the cyst is occupied by granular matter, often contained within secondary and more delicate cysts or cellules, generally of a circular figure, and occasionally having within them a third still smaller cyst. The diameter of the latter is about $\frac{1}{4000}$ th of an inch, and of the secondary cysts $\frac{1}{1500}$ th of an inch is a common size, although their magnitude is very variable. The granules within the cells or cysts also differ much in size, but they are very commonly about $\frac{1}{8000}$ th of an inch in diameter. When the ova of the *Distoma* are compressed forcibly, the operculum is lifted up or even separated entirely, and the granular matter extruded, with its containing cells or cysts generally broken. The operculum does not appear to exist in the smaller and immature ova. Whether what is commonly called the ovum of the Entozoon, may may not be a cyst containing numerous ova within it, and furnished with an operculum, to allow of their extrusion when mature, and fit for propagation, appears to Mr. G. to be an interesting question. At all events, it should be ascertained if the cysts be discharged with the dung of the diseased sheep, whether the granules have escaped or not; and whether they are to be found in the pasturage of those localities, where the Entozoon is sometimes known to be propagated so quickly as soon to infect entire flocks of sheep. Mr. G. could never see any thing like a small fluke in the outer cyst, at any period of its growth, although the operculum was often observed just ready to open and give exit to its contents, as above described. The granules may possibly be regarded as yolk-globules, in which case Mr. G. apprehends the numerous secondary cysts, or cells, must be considered as so many different yolks."—*Proc. Zool. Soc. Lond., March 10th, 1840.*

Broderip and Brewster on the Structure and Optical Characters of Bulinus velatus, and other Land-Shells, collected by Mr. Cuming.—In a

great number of the beautiful land-shells of the Philippine Islands, collected by Mr. Cuming, the pattern, upon immersion in water or other fluid, becomes entirely obliterated till evaporation restores the colours to all their pristine brilliancy. In this species, the very reverse is the result of the immersion. The external whitish porous epidermis which veils the shell when dry, suffers the bright colours to shine out when immersed in water. *B. velatus* is described above, as it appears on immersion, and before it becomes dry; but in the latter state the beauties of the shell are shrouded, and the colour of the sutural bands, peeping out between interstices in the epidermis, gives to these bands a moniliform appearance. Mr. Broderip forwarded to Sir D. Brewster, four or five species of those land-shells, from which the pattern disappears upon immersion; but he has not as yet forwarded to him any upon which the colours come out when so treated. The following is an extract from Sir D. Brewster's letter on the subject:—"The disappearance of the white pattern by immersion in water, or any other evaporable fluid, and its subsequent re-appearance when the shell is dry, are phenomena perfectly analogous to those of *hydrophanous opal*, *tabasheer*, and other porous substances. The phenomenon in land-shells is still more beautiful when we examine them by *transmitted* light. The pattern, which is *white* by *reflected* light, is *dark* by *transmitted* light, and *vice versa*. This is particularly beautiful in the *Helix pulcherrima*, where the ground of the *white* pattern is almost *black* by reflected light, and of a light *reddish* colour by transmitted light, the pattern which is *white* by reflection having a *dark red* colour by transmitted light. In all these shells the difference of structure by which the pattern is produced, does not exist in the shell, but in the *epidermis*, and hence the pattern may be wholly obliterated by removing the epidermis. It appears to me, from very careful observations, that the epidermis consists of two layers, and that it is only the upper layer which is porous whenever the pattern is white. These *white* or porous portions of the epidermis differ from the other parts of the upper layer only in having been deprived of, or in never having possessed, the element which gives transparency to the membrane, in the same manner as *hydrophanous opal* has become *white*, from the expulsion of its water of crystallization. When the shell is immersed in water or any other fluid, the fluid enters the pores of the white epidermis, and having nearly the same refractive power as the epidermis, no light is reflected at the separating surface of the water and the pores which contain it, so that the light passes through the membrane, which thus loses its white appearance. When the water escapes from the pores by evaporation, or is driven from them by heat, the membrane again reflects white light from the numerous surfaces of its pores.

"As the colouring matter resides in the shell itself, its peculiar colour is seen through the epidermis as distinctly where it is porous as where it is not porous, when the porous portion has been rendered transparent by the absorption of a fluid.

"If we apply oil or varnish to the white pattern, we may obliterate it permanently, or we may change it into a pattern entirely different from the original one."—*Proc. Zool. Soc. Lond., Feb. 9th, 1841.*

XVII.—ON THE STRUCTURE OF THE NUT KNOWN AS VEGETABLE
IVORY.*

By Daniel Cooper, A.L.S., Surgeon.

THE seed or nut of the Tagua-plant, a species of the genus *Phytelephas*, belonging to the order Pandanæ of Brown, and Cyclanthaceæ of Lindley, of late much imported from South America as a substitute for the various uses to which ivory is applied in the arts and manufactures, as far at least as its size will admit of, is of a very hard character internally, and when turned in the lathe with sharp-edged tools, takes a polish even finer than the ivory of commerce. Desirous of ascertaining its structure, I caused a portion of the hard, compact, albuminous seed to be cut with a lapidary's wheel, and ground very thin,—it was then submitted to the test of the microscope.

The structure was at once apparent, inasmuch as it seemed to be composed of a homogeneous substance (without the slightest appearance of cells or any other elementary structure, even under a tenth of an inch achromatic object-glass of Powell's construction), traversed by canals or tubes in one direction, only somewhat irregular in their shape, and occasionally terminating abruptly in a fimbriated extremity, as seen in the Fig. at *c*. These tubes evidently contained an oily fluid, judging from their dark colour, and the perceptible difference of refractive power. The regularity with which the diminutive lateral prolongations of the main canals are given off from the internal parts of two adjoining canals is deserving of notice. As soon as they arrive at about the centre of the intervening space, these small canals terminate in a blind pouch, at the end of almost all of which a slight enlargement is discernible. Their development seems to be arrested by an evident, though at the same faint line of demarcation (*b, b, b*), to be seen with a good achromatic object-glass.

In proof of the great degree of regularity pervading this structure, a reference to the figure will at once satisfy the observer; at *a, a*, for example, one of these lateral blind pouches is given off from one side of a canal, and this is bifurcated at its extremity, where it meets with the line of demarcation before described; at the corresponding point on the adjacent canal a similar divided extremity is to be recognized, in every instance

* Read before the Linnæan Society, December 7th, 1841.

in which I have observed this structure. I am inclined to imagine, that four or more of these blind extremities of the lateral canals meet together at this faint line, which indicates the limits of these lateral prolongations, and, like the larger canals from which they proceed, are also filled with oil, even to their extreme end, which is, as before observed, more or less inflated, and sometimes though very rarely recurved.

It must be observed, that some of these canals were empty, and only a trace of their parietes remained apparent. This was the case, when, in the process of grinding the nut, a portion of the wall was removed, and the oil had escaped. The specimens examined were immersed in Canada Balsam, which, at the same time that it rendered the adjacent albumen and walls of the empty canals more clear, did not in the slightest degree alter the appearance of those filled with oil.

In Martius's splendid work on the Palms,* a plate is given of the microscopic structure of the albumen of *Sagus tædigera*. In this work he figures and describes "canales in cellularum membranis excavatis;" but these are widely different from those I have called attention to, inasmuch as there is not represented any main trunk or canal filled with oil, with lateral prolongations, similar to those I have mentioned as occurring in *Phytelephas*. In this drawing, of which Pl. 4, Div. 2, is a copy, the same regularity is observed in the giving off, in directly opposite situations of these small lateral canals in Martius's figure, as in my sketch; but there is no indication of their direct commencement exhibited; they appear as if they were only the walls of the cellular tissue, the membrane stretched across which is more or less spotted. This structure in the membrane of the albumen under consideration, I have not been able to observe, although I have made use of very high achromatic powers, with attentive examination. In the same work, Pl. N. f. 7, a similar arrangement of the lateral prolongations as that figured of *Sagus tædigera* (Pl. 4, Div. 2), is shown in the parenchyma of the external part of the stem of *Cocos botryophora*, and also at Pl. N. f. 9 in the cellular putamen of *Attalea excelsa*.

A comparative examination of the sketches accompanying these remarks, will at once render evident the palpable existing differences.

I am induced to think, that it is owing to the presence of such vast numbers of reservoirs of oil, combined with its compactness, that this nut, when turned with a sharp tool, takes such a fine and lasting polish. To decide the part in the economy of the seed these oily canals perform,

* Nova Genera et Species Palmarum. Munich, 1826. Pl. O. f. 14.

independent of that of probably supplying a larger quantity of carbonic acid, hydrogen, and azote, by the decomposition of the oil at the period of germination of the embryo, than could almost, under any other natural circumstance be the case, is a question I leave for the consideration of physiologists.

Explanation of the Figures, Plate IV, Div. 2 & 3.

Div. 2. *a, a.*—*Bifurcated* extremities of two *opposite* lateral canals. *b, b, b.*—The faint line of demarcation, where the lateral branches of the main *oily canals* terminate in blind pouches. *c.*—*Fimbriated* extremity of one of the principal *oily canals*, as observed with a quarter of an inch achromatic object-glass of Powell's construction.

Div. 3.—Albumen of *Sagus tædigera*, as figured by Martius, (Nov. Gen. et Spec. Palm. Pl. O. f 14.) There is not here represented any *main* trunk or *canal* filled with oil, with lateral prolongations similar to that of *Phytelephas*, Div. 1.

XVIII.—OBSERVATIONS ON SOME INFUSORIA CONTAINED IN WATER PROCURED IN AFRICA.*

*By George Busk, Esq., Surgeon to the Hospital Ship,
Dreadnought, &c.*

ON the departure of the late Niger Expedition, I requested my friend Dr. Stanger, to procure specimens of water from different localities in Africa, with a view to the examination of their Infusorial contents. A few bottles were thus obtained, but two only among them contain any thing worthy of notice, owing to the decomposition of the organic remains which has taken place; and even in these two scarcely anything remains, but the silicious shells of the Infusoria, and some imperfect fragments of Confervæ.

The portions of water, which have afforded the Infusoria I am about to describe, were procured from two localities.

1. From a small pool of fresh water one mile inland from the river Sinoë, in Western Africa, and which was most likely not dry in the dry season. It was collected on the 12th July, 1841.

2. From a lake called "The Salt Lake," two miles west of Cape Coast Castle; the water of which is fresh, but subject to be occasionally mixed with water from the sea. This was procured on the 28th July.

In the first of these specimens of water, I have been able to make out thirteen species of Infusoria, to which I have affixed the names of

* Read before the Microscopical Society of London, April 27th, 1842.

those species, whose figures in Ehrenberg's work, most nearly agree with them. These species are :—

1-2. <i>Eunotia diadema</i> .	12. <i>Fragillaria grandis</i> .
3. ——— serra.	13. <i>Navicula</i> ?
4. ——— triodon.	14. ——— ?
5. ?	15. ——— ?
6. ?	
7. <i>Euastrum integerrimum</i>	—————
8. <i>Navicula viridis</i> .	16. <i>Conferva</i> ?
9-10. <i>Navicula</i> .	17. <i>Sygnema spirogyra</i> .
11. <i>Bacillaria vulgaris</i> .	18. ?

All these, except one, are silicious : the exception is so imperfect as not to admit perhaps of correct naming. Most, if not all, of the silicious cases contain more or less green granular matter, and are, without doubt, the remains of Infusoria still living, in their native place. With the exception of the three or four species of *Eunotia*, these Infusoria are among those most commonly met with in almost every locality, and it is consequently, principally with reference to the former that I am desirous of making a few observations.

It would appear that up to a comparatively very late period, only one or two living species of *Eunotia* had been met with.

All the other numerous species of this genus, have been considered till lately to be confined to certain fossil deposits, and to them only in high northern latitudes in America and Europe. Among the species thus looked upon only in the light of fossils, are at least three of those which are contained in this African water, viz.,

Eunotia diadema, *Eunotia serra*, *Eunotia triodon*,

which are stated by Ehrenberg to have been found in the Bergmehl, at Dagernförs in Sweden, and at Kymmene Gärd in Finland. If it had proved to have been really the case, that these species were only met with as fossils in these northern latitudes, the fact might have afforded a fertile field for speculation as to the kind of climate prevailing in those localities at the time in which these deposits took place, and might, perhaps have been supposed confirmatory of what however does not require such evidence, the received opinion that the climate in the northern hemisphere was at some period very much hotter than at present. The curious circumstance, however, lately related to this Society by Mr. J. Quekett, of his discovery of certain species of Infusoria in some water from Melville Island, identical with those found fossil at Rich-

mond, in America, if looked upon in the same light, would tend to lead to the opposite conclusion, and to the supposition that the climate of that part of North America, was at the time of the deposit of the Richmond bed, much colder than it is at present. A contradiction sufficiently obvious. The fact however is, as later investigation has proved, that no such deductions, as to climate, can be made from the occurrence of fossil Infusoria.

In a paper read last June before the Berlin Academy, by M. Ehrenberg, he gives lists of numerous Infusoria, found in earth brought from various localities, in the Arctic regions and elsewhere, and among these is a catalogue of 51 species of Infusoria, found in the earth adhering to the roots of moss procured in the neighbourhood of Okok in Labrador, and of these there are several living species of *Eunotia*, three of which are identical with those of the African water. Thus we have, at the same period, from two localities, so far apart and so different from each other in respect of climate as Labrador and the Guinea Coast, the same species of Infusoria still living. How independent, then, must not these minute organisms be, not only of climate and nature of food, but also of great mutations of the earth's surface, when we find them living contemporaneously, at the pole and under the line, and belonging to the tertiary as well as to the present periods? Of the species of *Conferva* I am only able to name one, the *Sygnema spirogyra*.

In the second specimen of water, I am unable, from the decomposition, to determine more than three species of Infusoria : —

1. *Euastrum margaritiferum*.

2. *Euastrum ansatum*.

3. ?

and upon these it is not worth while, perhaps, to make any observations; remarking only upon the absence, in this instance, of any of the species found in the first specimen-water, and from a locality comparatively so near. The absence is probably attributable to the occasional irruption of sea-water.

XIX.—ON A PORTABLE POCKET MICROSCOPE FOR MEDICAL MEN, NATURALISTS, AND FOR ILLUSTRATION IN THE CLASS ROOM.

THE importance of the Microscope as a means of detecting many abnormal conditions of the human frame, altogether inappreciable to unassisted vision, has become now fully established and admitted. The reason why it has not been used by the medical profession, as a

means of arriving in many instances at a greater approximation to the nature of disease, is threefold :—first, the bulk of those hitherto constructed, occupying too much space to be constantly carried about the person of the practitioner : second, the great expense attendant on the purchase of useful microscopes : third, the very imperfect and inconvenient articles which have until within a few years been made for sale.

All these points having been duly considered, Mr. Cary of the Strand, has constructed a simple and portable instrument, which will be found adequate and of sufficient power for the general purposes of the Physician, the Naturalist, and for illustration in the Class Room. Professors of Animal and Vegetable Physiology, as well as Travellers, will, it is anticipated, find in this little microscope, very slightly modified from that invented and used by Mr. Children some years since, sufficient power and definition for general purposes ; and while the pocket lens has its use, together with the various others which have, from time to time, been brought before the public, it is to be hoped this little instrument may even be more serviceable, and deserving of notice ; especially as it is so constructed as to view objects either transparent or opaque ; the latter being accomplished by means of Lieberkuhn's to the half and quarter inch single lenses only. Either of these powers is well adapted for viewing such objects as the Foraminifera, portions of fine anatomical injections, parts of insects, and the like.

The instrument consists simply of a bed on which the object-holder is made to move to or from the power, by means of an endless screw, turned at one extremity by a milled head. The thread of the screw is sufficiently fine to adjust and focus the objects viewed by a doublet, which is the highest power that can be conveniently used. At the opposite extremity to the milled head, there is fixed beneath, a handle, which, by means of a hinge, folds back to the under side of the bed, as does also the part for holding the powers, rising in the opposite direction to the handle. Both of these portions may then, for portability, be placed in the same plane as the bed. The portion intended to carry the springs for holding the slide, is made so that the part ordinarily employed for carrying the object, may be instantly removed and replaced, or any other contrivance fitted, such as a short pin of iron wire, having at the end a ball-and-socket joint, which will enable the observer to move the object in any convenient position.

The powers accompanying this little instrument are half-inch, quarter of an inch, and tenth single lenses, with Lieberkuhn's or silver dishes to the first two, and a doublet. A condensing lens fits on to the bed, and

is capable of being moved in the line of the object-glass to any convenient distance. A small live cage, for examining animalcules or secretions, likewise accompanies the other apparatus, as do also small black discs, cemented on glass, which serve to place objects upon intended to be viewed as opaque, as well as stops. The price, complete, is about two guineas and a half.

The great advantage of this form of microscope over those generally constructed as single microscopes, is that of enabling the observer to view the object without stooping continually, and placing his body in the position which is so liable to produce fatigue. By holding the bed of the instrument as nearly parallel as possible to the flame of a lamp or candle, or holding it against a clear sky, a sufficient degree of light is obtained to work with advantage with the powers intended to accompany it. Such an instrument is doubtless capable of considerable improvement, and is merely noticed here with a view to call the attention of naturalists to the subject, feeling assured that there are many who would hail the appearance of such a desideratum, affording a magnifying power more at command and greater in execution than the ordinary pocket lens, and made at the same time with every attention to portability.

XX.—ON THE FORAMINIFERA OF AMERICA AND OF THE CANARY ISLANDS.*

ALCIDE D'ORBIGNY, celebrated for his travels in South America, has lately published three long essays on the imperfectly known Class of the *Foraminifera*. One appeared in the *Histoire Physique, Politique, et Naturelle, de l'Ile de Cuba, par M. Ramon de la Sagra*; a second, in the *Histoire Naturelle des Iles Canaries, par M M. P. Barker-Webb et Sabin Bertholot*; and a third, in the *Voyage dans l'Amérique Méridionale, par M. Alcide D'Orbigny*. As these Memoirs, so highly important for this class of animals, are contained in very expensive works,

* From Jameson's Edinburgh New Philosophical Journal. January 1841.

[We had commenced preparing an abstract of the researches of M. Alcide D'Orbigny "On the *Foraminifera*;" but having been anticipated by our contemporary, we avail ourselves of the very excellent introductory account given in the work just cited, and intimate our intention in a future number, of giving the general tables of Classification given by M. D'Orbigny in his *Foraminifères de l'Ile de Cuba*, published in the *Histoire Physique, Politique, et Naturelle de l'Ile de Cuba*, par M. Ramon de la Sagra.—Editor.]

and are therefore the less accessible to the public, some extracts from them may not be without interest for our readers.

Everything in nature which escapes the eye, not only remains unknown to the great mass of the people, but even unnoticed for centuries by those who anxiously endeavour to investigate the beauties of creation. How many myriads of beings are still unknown to us! How many years must yet elapse ere we acquire an adequate idea of the extent of zoology!

If the enormous size of the largest animals of our globe leads us to contemplate the omnipotence of the Creator; if the regularity of their forms, the adaptation and perfection of their organs, the richness of their whole structure, prove to us their wonderful completeness; so our understanding is not the less astonished when we descend to those hardly noticeable beings, whose number counterbalances their infinite minuteness; so that by their multiplicity they perform, without our being aware of it, one of the most important parts in nature. Can it indeed fail to strike with wonder every one who reflects, that the sand of all sea-coasts is so filled with these microscopic animals termed *Foraminifera*, that it is often composed of them to the extent of no less than a half? Plancus* counted 6000 in an ounce of sand from the Adriatic Sea; we ourselves have reckoned 3,840,000 in an ounce of sand from the Antilles. If we calculate larger quantities, as, for example, a cubic yard, the amount surpasses all human conception, and we have difficulty in expressing the resulting numbers in figures. And yet how insignificant is all this, when we regard in the same point of view the whole enormous mass of the sea-coasts of the Earth? We thence deduce the certainty, that no other series of beings can, in regard to number, be compared to the group we are now considering, not even the myriads of minute Crustacea which colour large spaces on the surface of the sea,† and which afford nourishment to the largest animals, viz. the whales; and not even the Infusory animals of fresh-water, whose shields partly compose Tripoli;‡ for these are limited in their distribution, whereas the *Foraminifera* occur on all coasts.

* Ariminensis de Conchis Minus Notis.

† Near Brazil we have seen the sea coloured of a deep red for nearly a degree, and this was caused by a species of the genus *Cetochylus*, which, according to the testimony of the whale fishers, forms almost exclusively the food of whales. See *Voyage dans l'Amérique Méridionale, part, hist, t. 1, p. 17.*

‡ Academy of Sciences of Berlin, 29th July, 1837. *Annales des Sciences Naturelles*, Vol. viii. p. 374; also *Edinb. New Philos. Journ.* Vol. xxii. p. 84.

If we inquire what part is performed by the minute animals now under consideration, and many of which do not attain a half, a fourth, or a sixth of a millimetre in size, we shall find no less reason for astonishment. The author has examined sand of all parts of the earth, and found that it is the remains of the *Foraminifera* which constitute, in a great measure, banks that interrupt navigation, which stop up bays and straits of the sea, and fill up harbours,* and which, together with corals, produce those islands that rise up in the warm portions of the Pacific Ocean. When we regard the influence of the *Foraminifera* on the strata of the crust of the globe, we become so much the more convinced of what we have said as to the living species, and it is easy to adduce facts to show that they contribute much to the formation of the whole deposits. Beginning with the newer epochs, the tertiary formations, we have, above all, a striking case in the environs of Paris. The *Calcaire grossier* of that extensive basin is, in certain places, so filled with *Foraminifera*, that a cubic inch from the quarries of Gentilly afforded 58,000, and that in beds of great thickness and of vast extent. This gives an average of about 3,000,000,000 for the cubic metre; a number so great as almost to preclude further calculation. We can hence, without exaggeration, conclude, that the capital of France, as well as the towns and villages of the neighbouring departments, are almost entirely built of *Foraminifera*. This group of animals is not less abundant in the tertiary formations, extending from Champagne to the sea, and its numbers are prodigious in the basins of the Gironde, of Austria, of Italy, &c. The cretaceous beds likewise contain myriads of these bodies, of which the white chalk from Champagne in France across to England is composed. We find also *Foraminifera* down to the lowest beds of the Jura formation.† Thus have these shells, which are hardly perceptible to the naked eye, altered not only the depths of the actual ocean as it now exists, but also previously to our epoch, formed mountains and filled up basins to a great extent.

These very abundant beings remained, nevertheless, unnoticed for centuries. The first were observed in the sand of the Adriatic Sea by Beccarius in the year 1731. It was for a long time believed, that that sea alone contained *Foraminifera*; and with the exception of some living ones observed in England by Walker and Boys, and some fossil species noticed by Lamarck as occurring near Paris, nothing was known

* See Ehrenberg's remarks on this subject, *Micros. Journal*, Vol. I, p. 162.

† See *Foraminifères de la Craie blanche du bassin de Paris*. By A. D'Orbigny. Published in *Mem. de la Société Géologique de France*.

of their presence in the other parts of the earth until the year 1825, when the author made known his first work on the subject.

We must ascribe the obscurity in which the *Foraminifera* have remained to the difficulty of their observation, and to the comparatively trifling results generally obtained from the investigation of microscopic bodies; and yet there are few branches of study more accessible to every one, and which afford more important consequences. Should an observer be resident on any coast whatever, of the various quarters of the globe, or on any tertiary, chalk, or oolite formation of a continent, he will find everywhere under his feet an immense multitude of *Foraminifera*, for whose examination a simple lens is sufficient. In regard to the importance of the study, it ought to possess equal interest for geologists as for zoologists; for the first, because it enables them to determine the temperature of the regions in which the fossil animals lived, by means of a comparison with those which still live in our seas, and also, because it gives them information respecting the formation of certain strata, questions of the highest importance for the history of our planet; and for the last, from the elegance of the forms of these animals, from their peculiarity of organization, and finally, because they constitute one of the most numerous class of animals, and, notwithstanding their minuteness, play an important part in nature. The facts relating to the geographical distribution of the *Foraminifera* are extremely interesting. The author has brought together 81 species from the coasts of the two sides of South America, a number which already affords data for certain conclusions, but which will doubtless be afterwards increased.

The configuration of the coasts, their greater or less depth of water, their particular nature, and more especially the direction of the great currents, have the greatest influence on the distribution and the number of species of marine animals. The configuration of South America is well known; every one is aware, that the narrow point stretching towards the pole, forms the most distinctly marked boundary between the Atlantic and the Pacific Oceans; but no one knows that there the direction of the currents contributes, not less than the configuration of the land, to disunite the two oceans. The great currents from the south-west polar regions, which flow towards the extremity of South America, there in fact separate into two different branches. The one proceeds eastward past Cape Horn, follows in the Atlantic Ocean the coast of the continent from south to north, and stretches along Patagonia and the Pampas from Buenos Ayres to the Brazil. The other, on the other hand, strikes against the extremity of America, remains in the Pacific Ocean, follows the shore from south to north, and proceed-

ing along the coasts of Chili, Bolivia, and Peru, extends beyond the equator. The Polar water, which is divided at Cape Horn, and which follows the coast on both sides, prevents the animals passing from one ocean into the other; for, to do so, it would be necessary for them to move against the current and against the prevailing winds, which is impossible. The form of the continent, and the direction of the currents, would therefore, *à priori*, render it probable that the two seas should possess entirely distinct Faunas, and that the only possible point of contact of the two should be at Cape Horn, where the separation begins. The distribution of the *Foraminifera* confirms this view.

Opposite Cape Horn, at a depth of about 160 metres, the bottom of the sea was examined by means of a sounding lead, having a diameter of only a few centimetres, and yet this small surface yielded a considerable number of *Foraminifera* and *Polypi*. This is a fact of great importance, because it proves that these animals can live in great depths of the sea, and gives us an idea of the innumerable multitudes of these beings in such cold regions. The bottom of the sea must, in the strict sense of the word, be covered with them, in order to be able to furnish more than forty individuals to so small an object as the sounding lead. Among these forty individuals there were five species: *Rotalina Alvarezii*, *R. Patagonica*, *Truncatulina vermiculata*, *Cassidulina crassa*, and *Bulimina elegantissima*. Of these five species, the first four occur only on the coasts of Patagonia and of the Malvinas, and therefore belong to the Fauna of the Atlantic Ocean; while the fifth lives in Chili and all Peru, and hence belongs to the Fauna of the Pacific Ocean. This result shews distinctly, that Cape Horn is the point of departure of both the Faunas peculiar to the two different seas, and that a larger number of species belong to the Atlantic than to the Pacific. This also is to be explained by the direction of the currents; for, as these come from the south-west, they must carry the water more easily to the east from Cape Horn than to the west, and hence must impart more of their peculiar species to the Atlantic than to the Pacific. This agrees extremely well with the distribution of the five species of *Foraminifera*.

Of the 81 species observed on the coasts of South America, 52 occur in the Atlantic Ocean, without even one of them presenting itself in the Pacific, and 30 are peculiar to the Pacific, without a single individual of them being found in the Atlantic Ocean. The only species common to the two seas (*Globigerina bulloides*), lives not only on both coasts of America, but also in the Canary Islands, in the Mediterranean Sea, and even in India. As it occurs everywhere, it does not alter the

well grounded results. The following list of the species will exhibit more clearly what I have said :—

SPECIES.	OF THE ATLANTIC.	OF THE PACIFIC.
1. <i>Oolina compressa</i>	<i>Malvinas.</i>	
2. ——— <i>levigata</i>	<i>Ditto.</i>	
3. ——— <i>Vilardeboana</i>	<i>Ditto.</i>	
4. ——— <i>caudata</i>	<i>Ditto.</i>	
5. ——— <i>Isabelleana</i>	<i>Ditto.</i>	
6. ——— <i>Melo</i>	<i>Ditto.</i>	
7. ——— <i>raricosta</i>	<i>Ditto.</i>	
8. ——— <i>striata</i>	<i>Ditto.</i>	
9. ——— <i>inornata</i>	<i>Ditto.</i>	
10. ——— <i>striaticollis</i>	<i>Ditto.</i>	
11. <i>Dentalina acutissima</i>	<i>Ditto.</i>	
12. <i>Marginulina Webbiana</i>	<i>Ditto.</i>	
13. <i>Robulina subcultrata</i>	<i>Ditto.</i>	
14. <i>Nonionina cultrata</i>	<i>Ditto.</i>	
15. ——— <i>subcarinata</i>	<i>Ditto.</i>	
16. ——— <i>pelagica</i>		<i>In the open sea.</i>
17. <i>Polystomella Lessonii</i>	<i>Malvinas ; Patagonia.</i>	
18. ——— <i>Owenii</i>	<i>Patagonia.</i>	
19. ——— <i>articulata</i>	<i>Malvinas ; Patagonia.</i>	
20. ——— <i>Alvarezii</i>	<i>Ditto.</i>	
21. <i>Peneroplis pulchellus</i>	<i>Malvinas ; Patagonia.</i>	
22. ——— <i>carinatus</i>	<i>Patagonia.</i>	
23. <i>Rotalina Alvarezzi</i>	{ <i>Cape Horn ; Malvinas ; Patagonia.</i>	
24. ——— <i>patagonica</i>		
25. ——— <i>peruviana</i>		{ <i>Valparaiso ; Cobija ; Callao ; Payta.</i>
26. <i>Globigerina bulloides</i>	<i>Malvinas.</i>	<i>Valparaiso.</i>
27. <i>Truncatulina dispar</i>	<i>Ditto.</i>	
28. ——— <i>vermiculata</i>	<i>Cape Horn ; Malvinas.</i>	
29. ——— <i>depressa</i>		<i>Valparaiso.</i>
30. ——— <i>ornata</i>		<i>Ditto.</i>
31. <i>Rosalina peruviana</i>		{ <i>Cobija ; Arica ; Payta.</i>
32. ——— <i>saulegi</i>		<i>Arica.</i>
33. ——— <i>araucana</i>		<i>Valparaiso.</i>
34. ——— <i>cora</i>		<i>Callao.</i>
35. ——— <i>inca</i>		<i>Ditto.</i>
36. ——— <i>consobrina</i>		<i>Ditto.</i>
37. ——— <i>rugosa</i>	<i>Patagonia.</i>	
38. ——— <i>ornata</i>	<i>Ditto.</i>	
39. ——— <i>Isabelleana</i>	<i>Malvinas.</i>	
40. ——— <i>Vilardeboana</i>	<i>Ditto.</i>	
41. <i>Valvulina pileolus</i>		<i>Arica.</i>

SPECIES.	OF THE ATLANTIC.	OF THE PACIFIC.
42. <i>Valvulina auris</i>		{ <i>Chili; Cobija; Arica;</i> <i>Callao; Payta.</i>
43. ——— <i>inflata</i>		<i>Valparaiso.</i>
44. ——— <i>inaequalis</i>		<i>Payta.</i>
45. <i>Bulimina pulchella</i>		{ <i>Valparaiso; Callao;</i> <i>Payta.</i>
46. ——— <i>ovula</i>		<i>Valparaiso; Callao.</i>
47. ——— <i>elegantissima</i>		{ <i>Valparaiso; Callao;</i> <i>Cape Horn.</i>
48. ——— <i>patagonica</i>	<i>Patagonia.</i>	
49. <i>Uvigerina raricosta</i>	<i>Malvinas.</i>	
50. ——— <i>striata</i>	<i>Ditto.</i>	
51. ——— <i>bifurcata</i>	<i>Ditto.</i>	
52. <i>Asterigina monticula</i>	<i>Patagonia.</i>	
53. <i>Cassidulina crassa</i>	<i>Patagonia.</i>	{ <i>Callao; Valparaiso;</i> <i>Cape Horn.</i>
54. ——— <i>pupa</i>	<i>Malvinas.</i>	
55. ——— <i>pulchella</i>		<i>Payta.</i>
56. <i>Guttulina Plancii</i>	<i>Patagonia.</i>	
57. <i>Globulina australis</i>	<i>Ditto.</i>	
58. <i>Bolivina plicata</i>		<i>Valparaiso.</i>
59. ——— <i>costata</i>		<i>Cobija.</i>
60. ——— <i>punctata</i>		<i>Valparaiso.</i>
61. <i>Biloculina peruviana</i>		<i>Payta.</i>
62. ——— <i>patagonica</i>	<i>Patagonia.</i>	
63. ——— <i>sphæra</i>	<i>Malvinas.</i>	
64. ——— <i>Isabelleana</i>	<i>Ditto.</i>	
65. ——— <i>irregularis</i>	<i>Ditto.</i>	
66. ——— <i>Bougainvillii</i>	<i>Ditto.</i>	
67. <i>Triloculina rosea</i>	<i>Patagonia.</i>	
68. ——— <i>cryptella</i>	<i>Malvinas.</i>	
69. ——— <i>lutea</i>	<i>Ditto.</i>	
70. ——— <i>boliviana</i>		<i>Cobija.</i>
71. ——— <i>globulus</i>		<i>Payta.</i>
72. <i>Cruciloculina triangularis</i>	<i>Malvinas.</i>	
73. <i>Quinqueloculina meridionalis</i>	<i>Patagonia.</i>	
74. ——— <i>patagonica</i>	<i>Ditto.</i>	
75. ——— <i>Isabelleana</i>	<i>Ditto.</i>	
76. ——— <i>Magellanicu</i>	<i>Malvinas.</i>	
77. ——— <i>peruviana</i>		<i>Arica.</i>
78. ——— <i>flexuosa</i>		<i>Ditto.</i>
79. ——— <i>inca</i>		<i>Ditto.</i>
80. ——— <i>araucana</i>		<i>Valparaiso.</i>
81. ——— <i>cora</i>		<i>Payta.</i>

Of the five *Foraminifera* of Cape Horn, four are peculiar to the Fauna of the Atlantic Ocean. Of these four, two are frequent in the Mal-

vinas, without extending to the northern coasts of Patagonia ; one occurs on the coast of Patagonia, without presenting itself in the Malvinas ; and one is common to both localities. We thus see that the *Foraminifera* of Cape Horn are distributed through the Atlantic Ocean, because they follow the direction of the currents.

In the Malvinas there are 38 species, a high number, when we take into consideration the southern position and the low temperature of these islands ; and this is a proof that the *Foraminifera* can live and multiply in all parts of the earth, and in all temperatures, if the locality be favourable. Of these 38 species, only five are found on the coast of Patagonia, near the Rio Negro. This might appear singular, did we not know that the currents which proceed from Cape Horn diverge not a little towards the southern portion of America, so that one of the two branches follows the coasts of the continent, while the other traverses the Malvinas, and in this way, the water which washes these islands, does not again come in contact with the coasts of the continent. Hence it follows, that the Malvinas and Patagonia can have in common only the species distributed over all coasts, while the Malvinas can possess their peculiar species, which are distinct from those of the continent. This is actually the fact, inasmuch as they afford no less than 33 peculiar species.

On the north coast of Patagonia, from the Bay of San Blas to the Peninsula of San Josef, that is, from 20° to 23° S. L., the author discovered 18 species of *Foraminifera*, of which five occur also in the Malvinas ; there thus remain thirteen species which are peculiar to this part of America.

In order to follow up this comparison, let us now direct our attention to the opposite side of America. Multiplied observations show, that near Valparaiso, in Lat. 34° S., the number of species varies in an extraordinary degree, according to the localities. In the sand of the Bay of Valparaiso, where the weakness of the current would lead us to suppose that light bodies must be accumulated in large quantity, two species only of *Foraminifera* were found ; but, on the other hand, on the opposite side of the point Cormillera, where the current is very perceptible, investigations made at the depth of twelve to twenty yards, on a bottom covered with corals, yielded a large number of *Foraminifera*. Hence it results, that the *Foraminifera* are more numerous where the current is powerful than in still bays. It is also ascertained, that this difference depends more on the natural constitution of the bottom, than on the currents, inasmuch as sandy and muddy coasts are less favourable for the *Foraminifera*, whereas the localities rich in corals are well

calculated to give development to great masses of these animals. In Chili twelve species of *Foraminifera* were collected, of which eight are peculiar to that region. The other four not only extend on the coasts of Bolivia, but are also met with in the Equatorial regions. We may assume that certain species are confined to certain limits of temperature, while others, less dependent on temperature, are transported by currents to all the shores of South America.

When we unite together the species of Arica and of Callao, in the harbour of Lima, that is, from L. 12° to 15° S., in order to compare them with those of 34°, we have fourteen, of which four occur also at Valparaiso, and four which extend northwards as far as Payta, and to the Equator. Thus there are only eight peculiar species; a proof that the *Foraminifera* of the Peruvian coast agree partly with those of the temperate regions of Chili, and partly with those of the warm regions of the Equator, but also offer some distinct species.

We have still to speak of the *Foraminifera* of the Equatorial regions, partly of those at Payta, in Peru, and partly of those at the mouth of the Guayaquil. There are nine species, of which four belong at the same time to the localities already enumerated, while the other five are peculiar to those places.

It is proved by the comparison of species, that the two coasts of South America present, as regards *Foraminifera*, two entirely distinct and yet contemporaneous Faunas. If we compare the species of the south coasts of the Atlantic Ocean with those of the Antilles, or with the Equatorial Fauna, which includes 118 species, we find that among the latter there are none of the species of the south coasts, and although both series are in the same ocean, yet they are totally distinct. This result may be applied directly to the geology of the Tertiary period, and proves that at inconsiderable distances on the same continent, entirely different and yet contemporaneous Faunas may exist. Different basins, therefore, which contain different species, may thus belong to the same epoch.

Having given this numerical comparison of the species, let us now glance at the distribution of Genera in the two Faunas of South America. In the order MONOSTEGA, we find that the genus *Oolina*, so common and so rich in species in the Malvinas, is not represented by a single species on the coasts of the Pacific. The order STICHOSTEGA affords the same result on the east coast; for, the genera *Dentalina* and *Marginulina* occur there, while we have no species in the Pacific. The more numerous members of the order HELICOSTEGA are

more uniformly distributed, but yet each sea has its particular genera. *Robulina*, *Polystomella*, *Peneroplis*, and *Uvigerina*, occur on the east coasts in the Malvinas, and in Patagonia; *Valvulina* alone occurs on the west coasts in Chili, Bolivia, and Peru; *Nonionina*, *Rotalina*, *Globigerina*, *Truncatulina*, *Rosalina*, and *Bulimina*, are common to both oceans. Of the ENTOMOSTEGA, *Asterigerina*, is met with only on the east coasts; *Cassidulina*, on both sides. The ENALLOSTEGA have the genera *Guttulina* and *Globulina* in the Atlantic alone, while *Bolivina* is exclusively found in the Pacific. Among the AGATHISTEGA we find the genus *Cruciloculina* in the east; while *Biloculina*, *Triloculina*, and *Quinqueloculina*, are inhabitants of the east as well as the west.

Combining these data, we find, that of the 24 genera of South America, there are 10 common to the two sides, 2 are peculiar to the Pacific, and 12 to the Atlantic; or, what is the same thing, 22 genera live on the shores of the Atlantic, and only 12 on those of the Pacific. If we ask the cause of this great difference in the number of species, and especially of the genera, between the two coasts of South America, we shall perhaps find a satisfactory explanation in the peculiar configuration of the two shores. Owing to the proximity of the Andes, the coasts of the Pacific are so steep, and the descent so abrupt, that no soundings can be obtained at a very short distance from land, viz., at a little more than half an English mile; thus a narrow stripe only remains for the *Foraminifera*, and sometimes they cannot live at all. On the shores of the Atlantic, on the other hand, the gentle slope of the land from the Andes to the sea is continued in the bottom of the sea, so that at a distance of more than two degrees from the coasts there is still a depth of water suited to the *Foraminifera*. There is therefore on this side of America, a broad zone on which the *Foraminifera* are propagated, whose surface is at least ten times as large as the other. This double fact affords an explanation of a very important question—that as to the undoubted influence of the configuration of the surface on the composition of the series of the beings which inhabit it, and also one of the most interesting applications to geology in the elucidation it offers as to the differences of species of fossil coverings of animals in contemporaneous formations. The rich materials of Cuba, Haiti, St. Thomas, Jamaica, Martinique, and Guadaloupe, afforded the result that Cuba, owing to its wide extent, and to its favourable position as to winds and to the currents from all other islands, possesses on its coasts all the species of *Foraminifera* which are met with on the shores of the Antilles; while the Cuba species are not distributed in proportion in the other parts of the Archipelago. Another result is that in regard to the multiplicity

of species met with in Cuba. No other place, with the exception of the Adriatic Sea, can be compared with it. Cuba has no less than 118 species, or a tenth part of the total amount known to the author.

The *Foraminifera* of the Canary Islands, 43 in number, having been investigated from too limited materials, we may suppose that a much larger number will yet be discovered. In regard to their geographical distribution, the following conclusions have been deduced:—The *Foraminifera* of the Canary Islands, which are common also to France, are seven, and form nearly the sixth part of all the species. They may be divided into three series, according to their mode of occurrence; viz., 1, On the coasts of the Ocean alone; 2, On the coasts of the Mediterranean; and, 3, On the coasts of the Ocean and Mediterranean. Of the first section we have no species; of the second, six, viz., *Orbulina universa*, *Globigerina bulloides*, *Planorbulina vulgaris*, *Truncatulina variabilis*, and *Textularia sagittula*; of the third, only one, *Truncatulina lobata*.

Hence it appears, that with the exception of the *Truncatulina lobata*, which is less dependent on temperature, as it occurs towards the North Pole, all belong to the Mediterranean Sea. We may, therefore, conclude that the *Foraminifera* found in the Canary Islands and on the coasts of France, live in dependence on the zone adapted to them, as the Mediterranean is warmer than belongs to its latitude, owing to its being sheltered from the northern currents.

The species belonging to the Canary Islands, which occur in other places, are four, *Orbulina universa*, *Lingulina carinata*, *Planorbulina vulgaris*, and *Rosalina valvulata*. These live also in the Antilles, and hence appear to be peculiar to tropical regions, or they are transported by winds or vessels to the American coasts.

There is another division of the species of the Canaries, viz., those which occur likewise in a fossil state. These are six in number; of which, five, *Orbulina universa*, *Lingulina carinata*, *Globigerina bulloides*, *Truncatulina lobata*, and *Textularia sagittula*, occur in the subapennine tertiary strata of Italy, and the three last also in the tertiary formation of Austria, near Nussdorf and Buitur. This number of identical species increases the approximation of the Canary *Foraminifera* to those of the Mediterranean; for the greater part of the species still living in this sea, also occur in a fossil state in the tertiary series of Italy and Austria. There still remains the sixth species, *Quinqueloculina lævigata*, which is found in the tertiary basin of Paris.

There are likewise 33 species which are peculiar to the Canary Islands. Taken together, these, though specifically distinct, possess the habit of those belonging to the Mediterranean.

XXI.—A CONTRIBUTION TO THE PHYSIOLOGY OF CELLS.*

By Martin Barry, M.D., F.R.S.

IN the second series of his researches in Embryology, the author had traced certain changes in the mammiferous ovum consequent on fecundation. The object of his present communication is to describe their further appearances obtained by the application of higher magnifying powers; and to make known a remarkable process of development thus discovered. In order to obtain more exact results, his observations were still made on the same animal as before, namely, the rabbit, in the expectation that, if his labours were successful, it would be comparatively easy to trace the changes in other mammals. By pursuing the method of obtaining and preserving ova from the Fallopian tube, which he recommended in his last paper, he has been enabled to find and examine 137 more of these delicate objects; and has thus had ample opportunity of confirming the principal facts therein stated. He has now procured in all 230 ova from the Fallopian tube. But being aware that repeated observations alone do not suffice in researches of this nature, unless extended to the very earliest stages, he again specially directed his attention to the ovum while it is still within the ovary, with a view to discover its state at the moment of fecundation, as well as immediately before and after that event.

The almost universal supposition, that the Purkinjian or germinal vesicle is the essential portion of the ovum, has been realized in these investigations; but in a manner not anticipated by any of the numerous conjectures which have been published. The germinal vesicle becomes filled with cells, and these again become filled with the foundations of other cells; so that the vesicle is thus rendered almost opaque. The mode in which this change takes place is the following, and it is one which, if confirmed by future observation, must modify the views recently advanced on the mode of origin, the nature, the properties, and the destination of the nucleus in the physiology of cells. It is known that the germinal spot presents, in some instances, a dark point on its centre. The author finds that such a point is invariably present at a certain period; that it enlarges, and is then found to contain a cavity filled with fluid, which is exceedingly pellucid. The outer portion of the spot resolves itself into cells; and the foundations of other cells come into view in its interior, arranged in layers around

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the central cavity ; the outer layers being pushed forth by the continual origin of new cells in the interior. The latter commence as dark globules in the pellucid fluid of the central cavity. Every other nucleus met with in these researches has seemed to be the seat of changes essentially the same. The appearance of the central portion of the nucleus is, from the above process, continually varying ; and the author believes that the nature of the nucleolus of Schleiden is to be thus explained. The germinal vesicle, enlarged and flattened, becomes filled with the objects arising from the changes in its spot ; and the interior of each of the objects filling it, into which the eye can penetrate, presents a repetition of the process above described. The central portion of the altered spot, with its pellucid cavity, remains at that part of the germinal vesicle which is directed towards the surface of the ovum, and towards the surface of the ovary. At the corresponding part, the thick transparent membrane of the ovum in some instances appears to have become attenuated, in others also cleft. Subsequently, the central portion of the altered spot passes to the centre of the germinal vesicle ; the germinal vesicle, regaining its spherical form, returns to the centre of the ovum, and a fissure in the thick transparent membrane is no longer seen. From these successive changes it may be inferred, that fecundation has taken place ; and this, by the introduction of some substance into the germinal vesicle from the exterior of the ovary. It may also be inferred, that the central portion of the altered germinal spot is the point of fecundation. In further proof that such really is the case, there arise at this part two cells, which constitute the foundation of the new being. These two cells enlarge, and imbibe the fluid of those around them, which are at first pushed further out by the two central cells, and subsequently disappear by liquefaction. The contents of the germinal vesicle thus enter into the formation of two cells. The membrane of the germinal vesicle then disappears by liquefaction.

Each of the succeeding twin cells presents a nucleus, which, having first passed to the centre of its cell, resolves itself into cells in the manner above described. By this means the twin cells, in their turn, become filled with other cells. Only two of these in each twin cell being destined to continue, the others, as well as the membrane of each parent-cell, disappear by liquefaction, when four cells remain. These four produce eight, and so on, until the germ consists of a mulberry-like object, the cells of which do not admit of being counted. Nor does the mode of propagation continue the same with reference to number only. The process inherited from the germinal vesicle by its

twin offspring, re-appears in the progeny of these. Every cell, whatever its minuteness, if its interior can be discerned, is found filled with the foundations of new cells, into which its nucleus has been resolved. Together with a doubling of the number of the cells, there occurs also a diminution of their size. The cells are at first elliptical, and become globular.

The above mode of augmentation, namely, the origin of cells in cells, appears by no means to be limited to the period in question. Thus it is very common to meet with several varieties of epithelium-cells in the oviduct, including those which carry cilia, filled with cells; but the whole embryo at a subsequent period is composed of cells filled with the foundations of other cells.

In the second series of these researches, it was shown that the mulberry-like object above mentioned, is found to contain a cell larger than the rest, elliptical in form, and having in its centre a thick-walled hollow sphere, which is the nucleus of this cell. It was further shown, that this nucleus is the rudimental embryo. From what has been just stated, it appears, that the same process, by which a nucleus in one instance transforms itself into the embryo, is in operation in another instance, where the product does not extend beyond the interior of a minute and transitory cell. Making allowance, indeed, for a difference in form and size, the description given of the one might be applied to the other. It was shown in the second series, that in the production of the embryo out of a nucleus, layer after layer of cells come into view in the interior, while layers previously formed are pushed further out; each of the layers being so distinctly circumscribed as to appear almost membranous at its surface. The same membranous appearance presents itself at the surface of the several layers of a nucleus in many situations. Farther, in the formation of the embryo, a pellucid centre is the point around which new layers of cells continually come into view; a centre corresponding to that giving origin to similar appearances in every nucleus described in the present memoir. It was shown that in the embryo this mysterious centre is present until it has assumed the form of the cavity, including the sinus rhomboidalis, in the central portion of the nervous system.

The process above described as giving origin to the new being in the mammiferous ovum, is no doubt universal. The author thinks that there is evidence of its occurrence in the ova of Batrachian Reptiles, some osseous Fishes, and certain of the Mollusca; though the explanation given of these has been of a very different character. It has hitherto been usual to regard the round white spot, or cicatricula, on the yolk of the bird's laid egg, as an altered state of the discus vitellinus in the

unfertilized ovarian ovum. So far from thinking that such is the case, the author believes the whole substance of the cicatrix in the laid egg to have its origin within the germinal vesicle, in the same manner as in the ovum of Mammalia.

There is no fixed relation between the degree of development of ova, and their size, locality, or age. The variation with regard to size is referrible chiefly to a difference in the quantity of fluid imbibed in different instances by the incipient chorion. Vesicles filled with transparent fluid are frequently met with in the Fallopian tube, very much resembling the thick transparent membrane of the ovarian ovum. These vesicles are probably unimpregnated ova, in the course of being absorbed. The so-called "yolk" in the more or less mature ovarian ovum, consists of nuclei in the transition state, and exhibiting the compound structure above described. The mass of these becomes circumscribed by a proper membrane. They and their membrane subsequently disappear by liquefaction, and are succeeded by a new set, arising in the interior, and likewise becoming circumscribed by a proper membrane, and so on. This explains why some observers have never seen a membrane in this situation. After the fertilization of the ovum, the cells of the tunica granulosa, that is, part of the so-called "disc," are found to have become club-shaped, greatly elongated, filled in some instances with cells, and connected with the thick transparent membrane by their pointed extremities alone.

That the thin membrane described by the author in his second series as rising from the thick transparent membrane in the Fallopian tube, and imbibing fluid, is really the incipient chorion, was then shown by tracing it from stage to stage, up to the period when villi form upon it. There remained, however, two questions undecided; viz., whether the chorion is formed of cells, and if so, whether the cells are those of the so-called "disc," brought by the ovum from the ovary. The author now states that the chorion is formed of cells, which gradually collect around the thick transparent membrane, and coalesce; and that the cells in question are *not* those of the "disc" brought with the ovum from the ovary. The cells which give origin to the chorion are intended to be more particularly described in a future paper.

The existing view, namely, that a nucleus, when it leaves the membrane of its cell, simply disappears by liquefaction, is inapplicable to any nucleus observed in the course of these investigations. The nucleus resolves itself into incipient cells in the manner above described. In tracing this process, it appears that the nucleus, and especially its central pellucid cavity, is the seat of changes which were not to have been expected

from the recently advanced doctrine, that the disappearing nucleus has performed its entire office by giving origin at its surface to the membrane of a single cell. It is the mysterious centre of a nucleus which is the point of fecundation, and the place of origin of two cells constituting the foundation of the new being. The germinal vesicle, as already stated, is the parent cell, which, having given origin to two cells, disappears, each of its successors giving origin to other two, and so on. Perpetuation, however, at this period, consists, not merely in the origin of cells in cells, but in the origin of cells in the pellucid central part of what had been the nucleus of cells.

The author shows that neither the germinal vesicle, nor the pellucid object in the epithelium-cell, is a cytoblast. He suggests, that the cells into which, according to his observations, the nucleus becomes resolved, may enter into the formation of secondary deposits—for instance, spiral fibres; and that they may contribute to the thickening which takes place, in some instances, in the cell-membrane.

The germ of certain plants passes through states so much resembling those occurring in the germ of mammiferous animals, that it is not easy to consider them as resulting either from a different fundamental form, or from a process of development which even in its details is not the same as what has been above described; the fundamental form in question in Mammalia—and therefore it may be presumed of Man himself—being that which is permanent in the simplest plants, the single isolated cell.

Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

Will on the Compound Eyes of Insects. (Continued from page 86.)—Amongst the *Neuroptera* in *Æschina grandis* a continuous and bright stratum of pigment exists, in which the bases of the crystalline bodies are placed, the latter being short and pyriform. The long and equably thick nervous fibril has in the centre a dark tube. Over the whole of the crystalline bodies, even of much of their bases, exists a transparent longitudinally striated skin. In *Agrion Virgo*, with the exception of these bodies being more conical than pyriform, the same conditions are found. *Libellula depressa* has pyriform-shaped crystalline bodies, which, with the exception of their bases, are imbedded in brown pigment. In the larva state, the nervous fibril increases in thickness the nearer the cornea, and contains a tube, which, so long as it is enveloped in a sheath, becomes but slightly thicker; anteriorly, the sheath suddenly ceases,

and the nerve is here provided with much pigment, whilst the inner tube forms a sort of conical cup, totally destitute of colouring matter. *Hemerobius perla* has long, narrow, conical, crystalline bodies, with slightly conical bases; behind them is a transparent, bason-shaped mass which surrounds their points, and as far as which proceeds the inner tube of the visual nerve: the whole cone is surrounded with dark pigment. Among the *Hemiptera*, *Ranatra* has elongated pyriform or oval bodies with convex bases. In *Naucoris*, they are short and bluntly conical, and enveloped in an almost black-coloured pigment, with which is connected a thin red layer of pigment lying upon the inner surface of the cornea, but having circular openings for the crystalline bodies. The comparatively very thick nervous fibril consists of a dark tube, and a very wide sheath. In *Cicada orni*, the crystalline bodies are three times as long as broad, have rounded points, and bluntly hexangular concave bases; anteriorly, the nervous fibril becomes thicker, and presents a reddish-coloured tube and yellow sheath, the former dilating itself around the crystalline bodies. Amongst the *Lepidoptera*, *Sphinx atropos*, *S. populi*, and *Cossus ligniperda*, have very long, roundly conical bodies, with slightly convex bases, which split into three-sided prisms. Behind each of these bodies, is a transparent substance, which envelopes their delicate points. In *Sphinx atropos*, the nervous fibril is equally cylindrical, but comparatively very thin, and covered with dark pigment, has no inner tube, envelopes the transparent substance and the cone with its bason-like expansion, and terminates in a membrane between the cornea and the conical bodies. In *Cossus ligniperda*, it becomes very much thickened shortly after it is given off, is devoid of pigment, but becomes thinner towards the cones, and surrounded with a dark-red pigment anteriorly. In *Pontia brassica* and *Vanessa urtica* the cones are small, short, pointedly conical, and of a yellow colour, they have slightly convex bases, and split into numerous prisms. The cup-shaped envelope of the cones is alone formed by the inner tube of the cylindrical nervous fibril. Before the base of the cones is found a transparent substance. A clear pigment is placed before the dark one of the fibril, and proceeds to the facets. Amongst the *Diptera*, *Musca domestica* has very minute, short, conical, crystalline bodies, whose thicker ends are covered with a purple red, the rest with a dark brown pigment. The cylindrical fibril surrounded with pigment, along with its internal tube, may be traced to the points of the cones. In *Tabanus bovinus* the same conditions exist.

As a *resumé* of his labours, the author gives as his belief that each of the faceted eyes possesses a pupil (opening in the pigment), a cornea, an aqueous humour (the mass between the cornea and the crystalline bodies), a lens probably surrounded with a delicate capsule (the crystalline body), a vitreous humour (the transparent substance between the posterior portions of the crystalline bodies and the anterior extremity of the expansion of the nerve), a visual nerve, a retina (the bason-shaped expansion of the visual nerve), and a choroid; and that therefore the crystalline bodies are not to be regarded as analogous to the vitreous humour, but are to be looked upon as crystalline lenses.

Ascherson on the Tegumentary Glands of the Frog.—The author alludes to numerous simple follicles, mostly opening outwardly, and which are also to be met with on portions of regenerated skin; they (on the sole of the foot at least) have no pigment near them, and often contract and become angular.

Cayla on the Measurements of certain portions of the Kidneys of the Horse.—

	Diameters.	Mm.
Terminal Venous and Arterial branches	0.000005	
Malpighian granules	0.0002	
Bloodvessels of the Tubular substance... ..	0.00001	0.000005
Arterial Stems to which the Malpighian gra- nules are attached	0.00002	0.00003
Tubuli urinifera at their mouth.....	0.0004	
Ditto in the middle	0.0001	
Polygons of the surface of the Kidney	0.0001	0.0015

[From *Schlechtendal's Linnaea*, 1842.]

Mohl on the Structure of the Punctated Vessels of Plants.*—When we examine the structure of punctated vessels, in reference to the tissues immediately surrounding them, we find it only in comparatively few Dicotyledons to be similar, and at the same time independent of that of the surrounding tissues. From such being the case, we can only take under consideration those vessels which we are thoroughly satisfied from observation stand in connection with *various* elementary organs, and all vessels must be excluded which are only surrounded with prosenchymatous or parenchymatous cells, as they in all cases possess a similar structure of their parietes. If we regard such separate running vessels as generally appear in *Rhamnus capensis* and *Viburnum opulus*, for example, we shall find a series of modifications of vascular structure, in which the influence of the approximated organs is evident enough.

A. The proper structure of punctated vessels is more completely developed in such plants in which the walls of the vessels admit of no variations, in which they may be connected with other vessels or cells, and everywhere equally provided with a dot and circle, as in *Eleagnus acuminata*, *Clematis vitalba*, and *Broussonetia papyrifera*.

B. In these vessels that wall which is contiguous to the prosenchymatous cells, has dots and circles like the other walls which are contiguous to vessels, but here the cell exerts its influence upon the vascular parietes, and the punctations are more distant from each other than those on the other walls. Such vessels may be found in *Bixa orellana*, *Acacia lophantha*, *Sophora japonica*.

C. In vessels of still more evident dependence upon the cells, their walls which are in connection with other vessels are thickly studded with the dots and circles, whilst those in connection with the prosen-

* We have translated the word *Getüpfelten* as *punctated*. *Tüpfel* we have rendered as the *dot*; the word *circle* is expressed in the original by *Hof*.

chymatous cells have them very distantly situate, large portions being quite free from them, and those near the medullary rays have the dot, but no circle. Such vessels may be observed in *Sambucus nigra*, *Betula alba*, *Aralia spinosa*, *Coryllus avellana*, *Populus alba*, *Alnus incana*, *Platanus occidentalis*, *Pyrus malus*, and *Gymnocladus canadensis*.

D. A higher degree of influence may yet be exerted by the cells, but which, in such cases, present more of a parenchymatous than a prosenchymatous appearance. Here, those vascular parietes alone which are contiguous to other vessels, possess dots along with their circle, whilst the walls lying next the cells have numerous large dots, but no circles, quite like the dots of parenchymatous cells. Such may be observed in *Cassya glabella* and *filiformis*, *Bombax pentandrum* and *Hernandia ovigera*.

E. A mere modification of the just-mentioned form, but which has a peculiar appearance, is seen in *Chilianthus arboreus* and *Cynanchum obtusifolium*; in which the parietes of a vessel which lies next to another vessel has a scalariform structure, the dots being elongated or stretched out into spaces of the whole width of the vessel, whilst the wall contiguous to the cells has large dots, but no circle. Though less strikingly, the same structure is seen in the common Vine.

To the above forms the greater number of punctated vessels may be reduced.

There is another description of vessels, however, which all agree in this particular, namely, the spaces between the several rows of punctations are not smooth, there running spiral fibres on the internal surface of the walls of the vessel. These bear the same relationship to ordinary punctated vessels as the dotted tubes of *Taxus* do to the other Coniferæ. In these vessels it is not merely the distribution of the punctations which has to be noted, as in the former description, but it must be observed whether all the vessels, or only a part of them, are provided with the fibres, and whether the punctations are found on every duct, or only on some. In some of these plants we can distinguish (though it must be confessed, not very absolutely) smaller and larger vessels of different structure, some will be found lying in groups together, more especially towards the inner circumference of the annual zone, and near which are often vessels of much smaller diameter, the tube having more the appearance of a prosenchymatous cell. These in the following description are called *smaller vessels*.

The above descriptions may be reduced to the following heads:—

F. All the vessels are provided with dots and circles; the larger ones have smooth walls, the smaller have spiral fibres running between the punctations. *Morus alba*, *Ulmus campestris*, *Clematis vitalba*.

G. All the vessels are closely punctated; between the rows of dots run narrow fibres. *Hakea oleifolia*.

H. The larger vessels have dots, the smaller have none. The walls of both are provided with spiral fibres on the external surface. *Daphne mezereum*, *Passerina filiformis*, *Bupleurum arborescens*, *Genista canariensis*.

I. The walls of the vessels abutting on other vessels are punctated, whilst those contiguous to cells have the dots very distant, or are quite free from them. All the vessels are provided with fibres. *Samara*

pentandra, *Tilia parvifolia*, *Æsculus hippocastanum*, *Acer pseudoplatanus*, *Cornus alba*, *Ilex aquifolium*, *Crataegus oxyantha*, *Prunus padus*, and *P. Virginiana*.

On reviewing the above remarks, it is evident that the general opinion of phytotomists, that the structure of punctated vessels is uniform, is erroneous; it is but in comparatively few cases the fact. The only point in which they all agree (and even here we must leave out of the question those comprised under division *H.*), and by which they are distinguished from other vessels, is the presence of dots with surrounding circles, and which at least are met with on those walls which are in contact with other vessels.

(*To be continued.*)

[From the *Gazette des Hopitaux*, 1842.]

Bouisson on the Microscopic Characters of the Bile.—In order to determine the microscopic characters of human bile, or of any of the higher animals, an amplification of 250 diameters must be employed, and the liquid should exist in a certain degree of concentration. Cystic bile, from a person previously subjected to a long abstinence, answers the best. The microscope develops three elements:—

1. Plates of yellow colouring matter slightly tinged with green, of variable size, and generally irregular.

2. Geometric corpuscles of crystalline appearance, less considerable in number than the plates of colouring matter, with which they are sometimes united. These corpuscles are cholesterine in a state of suspension, disappearing under the action of ether.

3. Globules of variable quantity, sometimes disposed in small coherent masses, at others associated with the lumps of colouring matter, to which they appear to serve as media of union. These globules belong to the mucus of the gall bladder.

From the above and other observations, the author concludes that the colouring matter is not entirely dissolved in the bile, but that a part is naturally precipitated; that the cholesterine, which, from the observations of Chevreul, has been thought to exist in the bile in a state of dissolution, is really in a state of suspension; and, lastly, that the mucus facilitates the adhesion of these two elements of the bile.

M. Bonjean de Chambéry, on the properties of the Microscopic Fungus called Ergot.—This experimenter states, as the result of numerous experiments,—1, That Ergot gathered the first day of its formation, does not possess the deleterious properties that it evinces on the termination of the sixth day. 2, That a heat of 100 degrees Cent. produces the same effects as too early gathering. 3, That fermentation also destroys these properties. 4, That ergot of old rye, not fresh and damaged, loses nothing in this respect.

Ehrenberg's preliminary Report upon a Deposit of Microscopic Organisms in Berlin.—In this report, which was read at the meeting of the Berlin Academy, in July 1841, he first referred to previous discoveries since 1834 of similar deposits in all parts of the world, and to the recent light which had had been thrown upon the mode of formation of such deposits by Infusoria, from observations made in the Zoological Gardens of Berlin.

All the hitherto known fresh-water forms had been silicious, and none calcareous; and all subterranean deposits consisted only of dead remains, affording evidence of having formerly lived on the surface, and of having died, and been covered by new generations, again dying in their turn.

In consequence of the close attention which had been awakened to investigations on this subject, great interest had been excited, by the discovery in Berlin itself of an extensive formation of Infusory remains.

The extent and thickness of this formation is then described, which appears to be situated at a depth of about 15 feet, and the bed to be from 5 to 28 feet or more in thickness. This formation of fresh-water Infusoria is by far the most extensive and the thickest of any hitherto known in detail. The deposit is composed of from $\frac{1}{3}$ rd to $\frac{2}{3}$ rds of its mass of silicious Infusoria, of which a very considerable portion is still living and breeding.

Many of the smaller shells are broken, but many others are uninjured, and present internally altogether the same organization as those at present in full vitality on the surface, near Berlin. They are filled with fresh and lively green granules, or cells, containing green ova. However, the number of such cells is less in the fossil than in the surface specimens. The greater part of the animalculæ forming the deposit, belong to the *Gallionellæ*, which are under all circumstances motionless. The author, however, on one occasion observed spontaneous motion in some small *Naviculae*; but these motions were very slight, and were wanting in most.

Another striking circumstance with regard to this Berlin deposit, is the fact, that the majority of the forms constituting it had not previously been found in the neighbourhood of Berlin, but that the same species constitute the deposits of Infusoria (Infusorien-Mehl), alternating with the brown coal and sandstone near Kliecken. It is farther remarkable that, intermixed with these Infusoria, there should be found many silicious spicula, which are abundant in marine sponges, but have never been found in river sponges in the living state near Berlin.

[From *Müller's Archives*, 1841.]

Müller on a peculiar Morbid Parasitic Formation with specific organized Seminal Corpuscles.—The disease here described was first observed in the cellular tissue of the orbit of a young pike, in the substance of the sclerotica, and between it and the choroid. It consists of cysts from one-fifth to one-half of a line in diameter, with very delicate walls, and containing a whitish substance, which is composed of very small granules, with molecular motion, and of innumerable corpuscles, very like

spermatozoa, but quite motionless. These corpuscles have an oval body and a tail. The body has a general resemblance to an elliptical blood-globule, and is about as large as the blood-globule of the pike, like which also it has two surfaces, and a thick edge. In its interior there are always at the opposite extremity to that whence the tail proceeds, two rather long vesicles, whose smaller ends converging at the end of the corpuscle, are there united, and thence lying symmetrically on it, gradually diverge to their larger extremities. Besides these vesicles, the corpuscles contain a transparent fluid. The tail of the corpuscle is a filament like those of spermatozoa, three or four times as long as the oval part, and sometimes bifurcated. It appears to be a prolongation of the wall of the corpuscle; the cavity of the latter is not continued into it.

In the pike the cysts, with such corpuscles as these, are found only in the orbit; but in several other river-fish, cutaneous eruptions are sometimes met with, consisting of vesicles with corpuscles differing from those just described, in not being caudate, but resembling them in containing the two oval diverging vesicles; and since his first observations were made, the author has found them in cutaneous eruptions in a number of fish, as well in those of his own country as in those of other parts of Europe, Brazil, North America, the Nile, &c. On the skin the vesicles are most common in the *Zander* (of which the author does not give the Latin name, but which we find translated as the *perch-pike*), and in this the mode of development of the corpuscles has been observed; for among a great number of them there are found some which show the two diverging vesicles separated and enlarged, and lying free in the interior of the corpuscle, and other examples in which two corpuscles lie near one another, surrounded by one very pale cell, and each presenting all the characters of the simple corpuscles, together with the rudiments of diverging vesicles in each. So that the mode of development of the corpuscles is in all probability this: the diverging vesicles are the germs of new corpuscles; and as they become developed, they swell up, separate, and lie in pairs within the cavity of the corpuscle, which is transformed into the thin-walled cell containing them. Then, as they are yet further developed, the maternal cell dissolves, and they become free, each as a separate corpuscle.

The author regards this as a remarkable example of the propagation of a disease by a living *Seminum morbi*; it seems to hold an intermediate place between the acknowledged parasitic Entozoa and Epizoa, increasing by distinct ova, and the cells of ordinary morbid structures increasing by the development of their nuclei, and of one cell within the other.—*Müller's Archiv. Heft. V. 1841, quoted in Brit. and For. Med. Rev., Jan. 1842.*

Grüby on the Vegetable Nature of Rupia, &c.—It has been shown by microscopic observers, that in the crusts of *Tinea favosa* and *Pseudotinea*, there are two very distinct vegetable growths. M. Grüby has since asserted, that he has discovered another plant in the bullæ of *Rupia*.—*Gazette Medicale de Paris, Août 24, 1841.*

[From the *Annals of Natural History*, April 1842.]

Willshire on Viscum Album.—Two or three years ago it was stated by Dutrochet, that in the nodi of *Viscum album*, no true woody matter existed; that the vascular connexion of the internodial spaces was therefore broken up, or was only maintained by a layer of *cellular tissue* or *pith*; this doctrine was admitted, and *Viscum* was supposed to form another illustration of what have been called *articulated stems*. Some time after, Decaisne published a small volume on the woody structure of this plant, in which he contradicted the statement of Dutrochet, and maintained that the vascular or woody portions of the internodial spaces were continuous, and the state of articulation was solely dependent upon the non-continuity of the vessels of the bark. Dutrochet again averred before the French Academy that his views were right. Here, I believe, the matter has rested. I have taken some pains to satisfy myself which of these theories is correct. I have examined portions of the plant both young and old, and at all portions of the nodal places, and I fully concur with Decaisne in stating, that the true woody and vascular structure of *Viscum* is perfectly continuous through the nodi; that there is no transverse and separating layer of cellular tissue or pith in this portion of the plant, but that the connexion of the inner layers of the bark is broken up at the nodi. *Viscum album* has not an articulated stem, in the proper sense of the word then. The vascular structure of *Viscum album* is by no means so entirely composed of those peculiarly marked and rather elongated cells, as is generally drawn and stated. Kieser's representations are often copied, but they only represent a part of the vascular apparatus; no doubt a great portion of the woody matter is composed of cells quite different from those met with in the wood of Exogens; but if the young wood or first-formed bundles be examined, plenty of very long annular ducts—and (to me) spiral ducts, with the fibre unrollable, however, as far as I have been able to detect—will be found. I may also remark, that the long pleurenychymatous cells surrounding the first-formed vascular bundles are carried along with the latter to the centre of the plant, around the pith of which they may be found, a circumstance somewhat analogous to that stated by Decaisne to take place in *Menispermaceæ*.

Willshire on the Scale of Adelia.—On the under surface of the leaf of *Adelia nereifolia* may be found a very beautiful and peculiar form of scale; it consists of two circular layers of cellular membrane, the one layer of much smaller diameter than the other, puckered and plaited, and of a saucer-shaped form; it is fixed by its centre, which apparently is connected with a *gland*, having coloured contents. From this form of scale, through that met with on *Eleagnus conferta*, I think transitional states may be seen, to the stellate hairs of many of the *Euphorbiaceæ* and *Malvaceæ*; in fact, upon the peculiar adhesions taking place between the cells, depends the appearance of the stellate hair or the scale of *Adelia* and *Eleagnus*. The occurrence both of stellate hairs and this form of scale in *Euphorbiaceæ*, shows the structural differences between the two not to be great in their origin.

April 27th, 1842.—J. S. Bowerbank, Esq., in the Chair.

A PAPER was read by G. Busk, Esq., entitled "Observations on some Infusoria contained in Water from Africa." The water was procured from two localities, and contained thirteen species of Infusoria, all of which, except three species, were common in ordinary water; the other three, which were of the genus *Eunotia*, were precisely similar to those discovered by Ehrenberg, as fossils in the Bergmehl of Sweden; but lately he has detected them in the recent state in earth from the neighbourhood of Labrador; thus having two localities of very different conditions as to climate, for the same species of Infusoria, which, the author states, would tend to prove that no certainty as to climate could be deduced from the occurrence of fossil Infusoria. (See the paper p. 99.)

Another paper was also read by the same author, "On the Young of a species of *Ixodes* from Brazil." These insects (a short account of which was given at the last meeting) were sent from Rio Janeiro in a letter, and were still alive, although upwards of 60 days had been spent on the passage over: they are called by the natives *Carapato*, and are highly injurious to cattle. The author described minutely their suctorial apparatus, and their general organization, and concluded that they were gifted with extraordinary powers of vitality, and imbibe their food through two suctorial tubes contained in the mandibles.

The Secretary read a letter from Dr. Southby of Bulford House, near Amesbury, Wilts, which had been handed to him by Mr. R. Taylor; it contained three different samples of disintegrated chalk from Salisbury Plain. Portions of each had been given to some members of the Society, and they had detected in them many forms of minute animals which were new to English microscopists.

Another communication was also read by the Secretary, from C. G. White, Esq., of Poplar. It will be recollected that in October 1840, Mr. White exhibited to the Society some beautiful specimens of supposed minute fungi, which he had found in tolerable abundance on gravel stones in the neighbourhood of Old Ford, Middlesex; they corresponded in some measure with the description of *Craterium pyriforme*, as given by Hooker and other botanists. Mr. White, having paid considerable attention to ascertain their true nature, has at last found them not to be of a fungoid nature, but the ova of a species of *Acarus*, with a body of a red colour, and six legs. Specimens of the insects, both in the egg, and after their escape were exhibited to the Meeting.

Microscopical Memoranda.

Apparatus to Prevent the Evaporation of Liquids under the Microscope.
—Vapours arising from the liquids under observation would, by condensing on the under surface of the object-glass form there round drops which act as so many lenses, and which, arresting the rays of light in their progress, would scatter them in every direction, and thus completely destroy the image before it could reach the object-glass. This effect takes place not only when the temperature of the liquid is

raised by the application of heat, either directly or in consequence of chemical action, but also when, in studying any body by the microscope, a fuming acid is used, such as the hydrochloric. This inconvenience is prevented by inclosing the frame of the object-glass in a small glass tube, shut at one end, whose inner surface is closely applied to the surface of the object-glass. This end is then plunged into the liquid, which is thus prevented from either beclouding the surface of the lens, or finding its way into the interior of the microscope, and there producing the same effect. Thus, if it be desired to observe the action of boiling water on a body, the mirror is removed, and a small lamp put in its place, and instead of the plain object-holder, a very thin watch-glass is used, which is filled with water, with a few fibres of silk, &c., to entangle and fix the particles which are to be observed, that the motions of the boiling water may not withdraw them from the eye of the observer. The extremity of the microscope (armed with its tube) is plunged into the water before the heat is applied, and the water must be heated gradually, and with a good deal of caution.—*Raspail's Organic Chemistry.*

Dalrymple on the Vascular Structure of the Allantois and Vitelline Membrane of the Incubated Egg.—The value of the observations on the close similarity detected by Mr. Dalrymple between the disposition of the capillaries of the allantois of the chick and those of the lungs of Batrachian animals, is much enhanced from the circumstance of the respiratory function of the vascular membrane lining the incubated egg having been rendered in some degree doubtful by the results of experiments made by Mr. Towne of Guy's Hospital, in which he believed that he had witnessed the development of the chick and allantois in eggs to which the access of air had been prevented. Experiment, however, has shown, that the eggs alluded to were not hermetically isolated from atmospheric influence; and I may observe, that it is essential in any experiments on the influence of the air in animal development, to establish in the first place, by adequate chemical tests, the impermeability to air of the insulating covering of the egg, on whose efficiency in hermetically excluding gas, the value of the experiments altogether depends. When such impermeability of the insulating medium is assumed, as in Mr. Towne's experiments, and not proved, such experiments can only lead to an opinion, and not establish any scientific result. The requisite pains and precautions, which the present advanced condition of chemical science enables the experimenter to put in practice, have been faithfully and effectually taken by Dr. Schwann of Berlin, and the results of his experiments have completely established the opinion of Hunter and other physiologists, that the allantois is a temporary respiratory organ; which opinion Mr. Dalrymple's microscopic observations have so ingeniously supported by the discovery of the close resemblance of this transitory vascular membrane to the persistent lungs in certain animals.—*Extracted from Prof. Owen's Address, read before the Microsc. Soc. Lond., Feb. 13th, 1841.*

Martin Barry on Fibre.—An error has been pointed out to us in the last number of this Journal, p. 93, connected with the report of Mr. Edwin J. Quekett's observations on the fibre seen by him in a speci-

men of coal. Our report stated, that the meeting of the Microscopic Society of London, at which Mr. Quekett's remarks were made, took place on the 16th of March 1841, whereas it was twelve months later, being on the 16th of March in the present year. Our readers will have the goodness to make this correction, not merely that our Journal may not be deficient in historical accuracy, but because it involves a question of priority as to two discoveries,—the one by Dr. Martin Barry, in *recent* vegetable fibre; the other by Mr. Quekett, in the *remains* of vegetable fibre, found by him in a specimen of coal and of silicified coniferous wood. As to the respective dates, Dr. Barry's observations were made public, by the reading of a paper before the Royal Society, "On Fibre," Dec. 16th, 1841; in the abstract of which—inserted March 1st, in the Annals and Magazine of Natural History, from the printed "Proceedings" of that Society, No. 51, p. 364,—"*fibre*," vegetable as well as animal, is described as "*being to all appearance composed of two spirals running in opposite directions, and interlacing at certain regular intervals.*" [One of the instances given in the Paper itself, was the fibre of cedar wood.] Mr. Quekett's observations, as above stated, were made public at the meeting of the Microscopical Society on the 16th March following; and he is reported to have said, respecting the fibre seen by him in a specimen of coal, &c., that "*where there are more than one row of dots on each fibre, these dots appeared to be formed by two spirals wound in the interior in different directions, the turns of each connected at intervals by longitudinal bands, thereby leaving a transparent space by such arrangement.*" On comparing the words here printed in italics in the respective descriptions, it will be obvious that Mr. Quekett was mistaken when he stated his belief, in reference to his own observation, that "*nothing analogous had hitherto been detected in recent woods.*"

Note of the Inventor on the Side Reflector.—At p. 78 of this volume, "Mr. George Gwilt is described as the first to use the silver concave mirror in the manner in which Mr. James Smith under Mr. Gwilt's directions fitted one to his microscope." The remainder of the paragraph gives no information how this varies from the Lieberkuhn; but if it means the side reflector, I beg to inform you that I invented it about six years ago, and first exhibited it at one of Mr. Bowerbank's Monday evening meetings, and have occasionally supplied it with my microscopes ever since; and I believe the only alteration made by Mr. Smith under Mr. G.'s directions, is an extra joint, which Mr. G. conceives to give greater facility in the adjustment: but the method of using a detached mirror, and of receiving the light above the object, and of reflecting a greater quantity of more obliquely-directed light than a Lieberkuhn, with all the advantages resulting therefrom, is due to me."—*Andrew Ross, May 6th, 1842.*

Knox on the Food of the New Zealand Herring (?).—We have carefully perused the letters of Dr. Knox, relating to the food of a fish which prevails in the sea around New Zealand, and resembles the herring of the British seas, and have examined the specimens he sent. These, which were obtained by Mr. F. J. Knox from the stomach of the fish alluded to, appear to consist of the young of a species of Cyclops (?). In the mean-time, they are referred for further examination.—*Editor.*

XXII. — OBSERVATIONS ON THE MINUTE ANATOMY OF FATTY DEGENERATION OF THE LIVER.*

By William Bowman, Esq., F.R.S., Demonstrator of Anatomy in King's College, London; and Assistant Surgeon to King's College Hospital.

FATTY degeneration of the liver is found almost exclusively in phthical subjects. Louis met with it in forty out of one hundred and twenty cases. The organ is always enlarged in a degree proportioned, *cæteris paribus*, to the quantity of fat it contains. It is altered to a buff colour, resembling that of fallen leaves. In consistence it is nearly natural; and when sliced the knife is rendered greasy, and minute globules of fat appear, mingled with the blood. It has also an unctuous feel, greases paper, and readily inflames. This deposit of fat is never collected into masses, but is equally diffused throughout the whole viscus. It is remarkable that it occasions no obstruction to the portal circulation, as is clear, from its being always unattended with ascites. It never, indeed, gives rise to any symptoms (beyond those of mere enlargement) from which its existence might be suspected during life. Thus much is already known of the disease.

In examining under the microscope, a short time since, a specimen of this disease, taken from the body of a patient of Dr. Budd, in the King's College Hospital, I observed an interesting fact, denoting the seat of the fatty accumulation, which, with Dr. Budd's concurrence, I am desirous of communicating.

To make clear my meaning, I shall premise a very few words on the minute structure of the lobules of the liver. Mr. Kiernan has well described the *vascular element* of these minute representatives of the organ. It consists of a capillary plexus intervening between the portal and hepatic veins. The diameter of the capillaries in this plexus is very large, being nearly twice that of a blood globule; while the diameter of the capillaries in most other textures is the same as that of the blood globule, and in some (as muscle) even less, so that the blood globules only pass along by undergoing elongation. This large size of the capillaries of the liver, probably, has reference to the deficiency of propelling power in the portal circulation. This *portal hepatic plexus* may be termed *solid*, as it is extended in all directions, and presents

* From the Lancet of January 22nd, 1842.

areolæ of nearly the same dimensions in whatever plane it is cut. These areolæ are in general not larger than the diameter of the vessels which form them, so that a well injected specimen might appear to be composed of little else than vessels.

In the interstices of this capillary plexus lies the *secreting portion of the bile-ducts*. If a thin section of an uninjected lobule be examined with a sufficient magnifying power, it is seen to be almost entirely made up of small, irregular, angular particles, each containing a circular or oval nucleus, within which is a minute point or two, the nucleolus. These particles have a determinate outline, are of some thickness, and possess a fine granular aspect. They also contain (which is very remarkable,) one, two, or more globules of fatty matter, irregularly placed, and of somewhat variable bulk, though usually about the size of those represented from the healthy human liver, at Plate III, Div. 6, A.

We owe the first good description of these nucleated particles to Henle,* who (with Purkinje and Schwann) believes that they correspond with the epithelium found in all other true glands, and that they are the proper glandular element, to which the secretion is due. No one who has extensively examined the minute structure of glands, can well be of a different opinion, though it must be allowed that we are still ignorant of the precise anatomy of the ultimate ramifications of the biliary ducts. The oily globules found in the nucleated particles, appear to have special reference to the chemical nature of the secretion, which contains a large quantity of highly carbonized matters, that are to be regarded, according to Dr. Prout, as modifications of the *oleaginous principle*. The nucleated particles of the sebaceous glands also contain fat, and in this respect offer a striking analogy with those of the liver.

The microscope at once reveals the seat of the *fatty deposit in the diseased state of the organ*. Instead of containing a few minute scattered globules, *the nucleated particles are gorged with large masses of it*, which greatly augment their bulk, and more or less obscure their nuclei. (See Pl. III, Div. 6, B.)

This simple description develops the whole anatomical condition of the disease, as well as explains its rougher characters, the bulk, the colour, and the freedom of the circulation. The particles, lying in the interstices of the capillary plexus, enlarge slowly and equably, in such

* They have also been examined by other Foreign Anatomists, as well as British. Mr. Erasmus Wilson discovered them in 1838, in the liver of the cat, when as yet the works of Henle were unknown in this country.

a manner, as to exert no injurious pressure on the vessels, while their new contents impart that peculiar hue which characterizes the disease.

It also throws no little light on the nature and source of the disease. It seems to show that the fat is an *increase of a normal constituent*, and not a formation altogether unnatural in kind; thus distinguishing it from the fatty degenerations of other tissues, where fat is deposited in situations from which it is naturally absent. It likewise indicates an increased activity in the secreting action of the liver, for a considerable period before death, though why the *accumulation* of fat should occur within nucleated particles does not so clearly appear. To explain that fully, will require a more complete knowledge than we yet possess of the chemical affinities at play within these small laboratories of nature.

I cannot conclude without remarking, that the fact which has been detailed, is an admirable example of the kind and degree of insight into pathological changes, which the microscope is calculated to afford. It is happily unnecessary, in the present day, to come forward as the advocate of this invaluable instrument as an aid to the study of disease. The fact is also of uncommon interest, as an illustration of the strict subordination of the study of pathology, as well as that of *minute anatomy* and *minute chemistry*, as to semeiology and that coarse inspection of morbid changes, which has too long usurped the name of *morbid anatomy*.

Explanation of the Figures, Plate III, Div. 6.

A.—Nucleated particles from the healthy human liver.

B.—The same, from the liver affected with fatty degeneration.

a, a.—Nuclei. b, b.—Nucleoli. c, c, c.—Fatty globules.

XXIII.—FARTHER OBSERVATIONS ON THE FILLING UP OF RIVER-BEDS AND HARBOURS, BY MICROSCOPIC ORGANISMS.*

By M. Ehrenberg.

SPECIMENS had been received from M. Hagen of the masses which had been removed from the harbour of the Oder at Swinemünde, and from that of the Vistula at Dantzic. The masses which had been removed at Swinemünde, amounted in 1839, to 2,592,000; and in 1840, to 1,728,000 cubic feet (German).

* Abstract of the Paper read before the Berlin Academy, 10th June, 1841.

According to microscopical analysis, the mud of the harbour itself contained from $\frac{1}{3}$ to $\frac{1}{2}$ of its volume of distinguishable organic bodies. The sand taken from the navigable water outside of the harbour, appeared to be principally granitic quicksand.

The masses also deposited by the Vistula at Dantzic, and of which four specimens were sent, taken from the bed of the river, at various distances from the sea, according to a plan of the localities, were, indeed not so rich in microscopic organisms as those from Pillau, Cuxhaven, and Swinemünde, but as those from Wismar, on account of the great admixture of river sand, furnished only from about $\frac{1}{10}$ th to $\frac{1}{6}$ th of their volume of organic remains.

Marine forms, however, were found, at the point highest up the river, and marked No. 4, and from this locality also, was furnished the material least mixed with sand (Flugsand), and which was the richest in Infusoria.

Moreover the report, which was given in March of the results of investigation of the deposits of the Nile in Egypt and Nubia, in part furnished by the examination by Dr. Hemprich, on the small portions of earth adherent to plants collected in those countries, and the prospect thus opened of the possibility of readily arriving at a knowledge of these forms, from other and very distant parts of the earth, in a similar way, had prompted Professor Kunth, in the most liberal manner to furnish for microscopical examination, portions of earth which were adherent to some of the exotic plants in his rich herbarium. These materials were a portion of marine *Conferva* from the Falkland Isles, sent by M. Lesson; two specimens of Brazilian bog-earth (von Sellowschen Gräsern); a similar one from Peru, a portion of *Conferva* from the Sandwich Islands, and from the Marian Isles, both sent thence by M. Gaudichaud. All these materials, were respectively, as clearly from the places indicated, as the plants to which they were still attached.

Finally the author had received, by the kindness of the worthy traveller in Iceland, Dr. Thienemann of Dresden, at his request specimens of earth from Iceland, Labrador, and Spitzbergen. As the chief part of these materials thus belong to the American hemisphere, their investigation forms especially an addition to the "report, &c.," furnished on the 25th of March.*

From the examination in this way of the above mentioned particles, often extremely small, or scarcely a line in thickness from those distant

* Vide Ehrenberg's remarks, Vol. II., p. 26, of this Journal.

countries, the following results, as to the extent of animalcular life have been obtained.

In the Malvinas or Falkland Islands the following 30 species of microscopic organisms still exist;—

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| 1. <i>Achnanthes pachypus</i> | 17. <i>Grammatophora oceanica</i> . |
| 2. <i>Actinocyclus senarius</i> . | *18. ————— <i>stricta</i> . |
| *3. <i>Amphora navicularis</i> . | 19. <i>Navicula amphioxys</i> . |
| *4. <i>Arthrodesmus Taenia</i> . | 20. ————— <i>aspera</i> . |
| 5. <i>Cocconëis placentula</i> . | 21. ————— <i>Didymus</i> ? |
| 6. ————— <i>scutellum</i> . | *22. ————— <i>Lyra</i> . |
| 7. <i>Cocconema Lunula</i> ? | *23. ————— <i>peregrina</i> . |
| 8. <i>Eunotia Faba</i> . | 24. ————— <i>viridis</i> . |
| 9. ————— <i>amphioxys</i> . | *25. <i>Surirella</i> ? <i>australis</i> . |
| 10. ————— <i>biceps</i> . | ————— |
| 11. <i>Fragilaria constricta</i> . | 26. <i>Spongia acicularis</i> . |
| 12. ————— <i>rhabdosoma</i> . | 27. ————— <i>capitata</i> . |
| *13. ————— <i>Trachea</i> . | 28. ————— <i>Clavus</i> . |
| 14. ————— <i>Ventriculus</i> . | 29. ————— <i>fustis</i> . |
| 15. <i>Gomphonema clavatum</i> . | 30. ————— <i>aspera</i> . |
| 16. ————— <i>minutissimum</i> . | |

Out of all this number of forms, there are only seven new species, (*) which had not already been met with elsewhere. As a whole the forms belong to already known genera. Most of them are as yet only known as marine, and from this, it may with greater probability be concluded, that the whole of them are so. Several species belong to those, which assist in the formation of the chalk marl in the south of Europe.

For the Brazils, twelve still living species, from alluvial deposits are added to the nine already stated to have been met with in the edible clay of the Amazons, furnished by M. Martius, viz:—

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| *1. <i>Arcella ecornis</i> . | 8. <i>Synedra Ulna</i> . |
| 2. <i>Gallionella distans</i> ? | ————— |
| 3. <i>Himantidium Arcus</i> . | 9. <i>Lithodontium Bursa</i> . |
| 4. <i>Navicula viridis</i> . | 10. <i>Lithostylidium Serra</i> . |
| 5. ————— <i>amphioxys</i> . | *11. ————— <i>articulatum</i> . |
| *6. ————— <i>microstauron</i> . | *12. <i>Lithodermatium macrodon</i> . |
| 7. <i>Surirella oblonga</i> ? | |

* The new species, which as far as is yet known are characteristic of the countries, are marked with an asterisk.

There are among these, two new forms of Infusoria; but besides and accompanying them, silicious parts of phanerogamous plants, probably grasses, and of *Equisetaceæ*, are worth remarking. It would seem proper to distinguish such fragments with generic names in separate lists, in order they should not be disregarded; since it is not easy to determine to what plants they might belong. The silicious, marginal serratures of grasses are found plentifully under the silicious shields of the Infusoria. These will be named *Lithodontium* (*Thylacium*). The serrated, silicious fibres of the elongated cells of grasses, which are not immediately the epidermis, will be named *Lithostylidium*, and the silicious epidermis of the *Equisetaceæ*, *Lithodermatium*.

By this means, such botanical forms, which are frequently very distinct and characteristic, and hitherto unremarked, can be retained and compared by the microscope, without loading systematic Botany with misapplied names, by groundless guesses at their origin.

From Peru, besides the five species of marine Infusoria already noticed, as yet only four, from the interior are known, viz.:—*Eunotia Zebra*, *Fragilaria*?, *Navicula viridis*, *Spongilla lacustris*, of which no form can with certainty be indicated as new.

The addition to the fauna of Iceland, afforded by the materials collected by Dr. Thienemann is especially interesting. He has furnished marine Confervæ from the coast, and peat from Husavic. The peat is very rich in silicious Infusoria, although it is a good, in fact the best, combustible material in the island. It contains not fewer than the following thirty-six species:—

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| 1. <i>Amphiprora navicularis</i> . | 16. <i>Gallionella distans</i> . |
| 2. <i>Amphora libyca</i> . | 17. ———— <i>crenulata</i> . |
| 3. ———— <i>hyalina</i> . | 18. <i>Gomphonema acuminatum</i> . |
| 4. <i>Arcella hyalina</i> . | 19. ———— <i>Americanum</i> . |
| *5. <i>Cocconeis borealis</i> . | 20. ———— <i>longiceps</i> . |
| *6. ———— <i>longa</i> . | 21. ———— <i>truncatum</i> . |
| 7. <i>Cocconema asperum</i> . | 22. <i>Navicula amphioxys</i> . |
| 8. <i>Eunotia amphioxys</i> . | *23. ———— <i>æqualis</i> . |
| 9. ———— <i>bidens</i> . | 24. ———— <i>amphisbæna</i> . |
| 10. ———— <i>Diodon</i> . | 25. ———— <i>gastrum</i> . |
| 11. ———— <i>granulata</i> . | 26. ———— <i>legumen</i> . |
| 12. ———— <i>gibba</i> . | *27. ———— <i>liostauron</i> . |
| 13. ———— <i>prærupta</i> . | 28. ———— <i>microstauron</i> . |
| 14. ———— <i>Zebrina</i> . | 29. ———— <i>nobilis</i> . |
| 15. <i>Fragilaria striolata</i> ? | 30. ———— <i>phænicenteron</i> . |

31. *Navicula viridis*.

32. *Synedra Ulna*.

33. *Tabellaria trinodis*.

34. *Thylacium semiorbiculare*.

*35. *Lithostylidium polyedrum*.

36. ————— *pupula*.

Of Icelandic marine Infusoria, procured from Algæ, sent by Dr. Thienemann, the following twelve species, still living, are found there, viz. :

1. *Cocconeis scutellum*.

7. *Navicula aspera*.

2. *Denticella ? aurita*.

8. ————— *gracilis ?*

3. *Echinella ? Podosphenia ?*

9. *Podosira moniliformis*.

4. *Gomphonema clavatum*.

*10. *Striatella Thienemanni*.

5. ————— *minutissimum*.

11. ————— *arcuata*.

*6. *Grammatophora islandica*.

12. *Synedra fasciculata ?*

Among the fossil forms of the peat, are five new and peculiar ones, and two among the marine Infusoria. In the whole number of forty-eight Icelandic Infusoria, there is no new genus ; but it is worth while to remark the occurrence, together with the serrated Eunotiæ of Sweden, Finland, and North America, which are characteristic of the North,—of *Podosira moniliformis*, which is elsewhere met with only in Peru.

Equally interesting is the microscopic fauna of Labrador, which enumerates fifty-one living species, found in the earth, contained among the roots of some mosses. The following forms are found near Okok in Labrador :—

1. *Amphora libyca*.

17. *Eunotia Faba*.

*2. *Arcella disphæra*.

18. ————— *hexaodon*.

3. ————— *hyalina*.

19. ————— *monodon*.

4. *Cocconema asperum*.

20. ————— *prærupta*.

5. ————— *gracile*.

21. ————— *septena*.

*6. ————— *Lunula*.

22. ————— *tetraodon*.

7. ————— *tenue*.

23. ————— *triodon*.

8. *Closterium striolatum ?*

24. *Fragilaria binodis*.

*9. *Diffugia lagena*.

25. *Himantidium Arcus*.

10. ————— *oblonga ?*

26. ————— *gracile*.

11. *Eunotia amphioxys*.

27. *Navicula amphioxys*.

12. ————— *biceps*.

28. ————— *aspera*.

13. ————— *bidens*.

29. ————— *ceratogramma*.

14. ————— *Camelus*.

30. ————— *ceratostigma*.

15. ————— *Diodon*.

31. ————— *crucigera*.

16. ————— *diadema*.

32. ————— *dicephala*.

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| 33. <i>Navicula dilatata</i> . | *43. <i>Navicula semen</i> . |
| 34. ——— <i>gibba</i> . | 44. ——— <i>silicula</i> . |
| 35. ——— <i>gracilis</i> . | 45. ——— <i>viridis</i> . |
| 36. ——— <i>inæqualis</i> . | 46. <i>Striatella arcuata</i> . |
| *37. ——— <i>isotauron</i> . | 47. <i>Synedra Ulna</i> . |
| 38. ——— <i>Legumen</i> . | 48. <i>Tabellaria trinodis</i> . |
| *39. ——— <i>leptogongyla</i> . | 49. ——— <i>gastrum</i> . |
| 40. ——— <i>microstauron</i> . | 50. ——— <i>biceps</i> . |
| *41. ——— <i>pachyptera</i> . | ————— |
| *42. ——— <i>scalaris</i> . | 51. <i>Lythostylidium rude</i> . |

There are eleven peculiar species in Labrador, but no new genus among them.

From this list is afforded the very important result, that the northern *Eunotia*, which are here as elsewhere in northern countries, very numerous, occur in this locality with living *Closteria*, and such *Diffugia*, which are not preserved in the fossil state. Hitherto they were only known as fossil; and only one species, near Saltzburgh, has as yet been observed in the living state. They consequently appear to be forms peculiar solely to Northern climes, and will probably be found here and there in the Alps.

On this account, especially, was a small specimen of marine mud, from the bottom of the sea near Spitzbergen, examined with greater care and precaution. There were found in it nine species of the smallest organisms, among abundant clay ? particles. Three Infusoria with silicious shields, one *Spongia* or *Spongilla*, and four or five species of calcareous *Polythalamia* :—

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|----------------------------------|--|
| 1. <i>Coscinodiscus patina</i> ? | 5. <i>Triloculina trigonula</i> . |
| 2. <i>Navicula aspera</i> . | *6. <i>Nonionina arctica</i> . |
| 3. <i>Synedra Ulna</i> . | *7. <i>Rotalia borealis</i> . |
| ————— | *8. <i>Uvigerina</i> ? <i>borealis</i> . |
| 4. <i>Spongia acicularis</i> . | *9. <i>Serpula</i> ? <i>discus</i> . |

Four of the *Polythalamia*, are hitherto undescribed. From the investigation of the former twenty-four American localities, which was presented to the Academy in March, there was afforded the sum of two-hundred and fourteen species of the smallest organisms, of which seventy-one were peculiar to America, ninety-four living, and one hundred and twenty fossil.

The six localities now adduced, which are in great measure new, and embracing half the globe, contain one hundred and fifty-four forms, of which one hundred and sixteen are living, thirty-eight fossil, and thirty-one

new; consequently the number of species peculiar to America, amounts to one hundred and two; of those known as common to America and the Islands, to two hundred and forty-five; and of those known to be yet living there to two hundred and ten.

Besides this we are now able to determine the thirty-nine following species from materials collected in the Sandwich Islands:—

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| 1. <i>Amphiprora navicularis</i> . | 22. <i>Navicula curvula</i> . |
| 2. <i>Cocconeis placentula</i> . | *23. ——— <i>distauridium</i> . |
| 3. <i>Cocconema fusidium</i> . | 24. ——— <i>gibba</i> . |
| 4. <i>Diffugia hyalina</i> . | 25. ——— <i>gracilis</i> . |
| 5. <i>Eunotia amphioxys</i> . | *26. ——— <i>insularis</i> . |
| 6. ——— <i>bicornis</i> . | 27. ——— <i>pusilla</i> . |
| 7. ——— <i>Cocconema</i> . | 28. ——— <i>sigma</i> . |
| 8. ——— <i>gibba</i> . | 29. ——— <i>viridis</i> . |
| 9. ——— <i>prærupta</i> . | 30. <i>Podosphenia cuneata</i> ? |
| 10. <i>Fragilaria striolata</i> . | 31. <i>Staurosira construens</i> . |
| *11. ——— <i>lamella</i> . | 32. <i>Synedra scalaris</i> . |
| 12. ——— <i>trachea</i> . | *33. <i>Tabellaria platysoma</i> . |
| 13. ——— <i>diopthalma</i> . | 34. ——— <i>rhabdosoma</i> . |
| 14. <i>Gallionella distans</i> . | ————— |
| 15. <i>Gomphonema augur</i> . | 35. <i>Lithodontium bicornis</i> . |
| 16. ——— <i>clavatum</i> . | 36. <i>Lythostylidium rude</i> . |
| 17. ——— <i>longiceps</i> . | 37. <i>Spongilla acicularis</i> . |
| 18. ——— <i>rotundatum</i> . | ————— |
| 19. <i>Himantidium Arcus</i> . | *38. <i>Rotalia punctata</i> . |
| 20. <i>Navicula amphibæna</i> . | *39. <i>Nodosaria punctata</i> . |
| 21. ——— <i>ceratostigma</i> . | |

Of these thirty-four belong to the silicious Infusoria; three are silicious particles of plants; and two are calcareous *Polythalamia*. From the two latter forms the mass is distinctly indicated to be of marine origin. Six species are peculiar; all belong to known genera.

Finally there is a small fauna of the Marian Islands, in which may be reckoned thirteen species:—

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| 1. <i>Cocconema fusidium</i> . | 9. <i>Navicula viridis</i> . |
| 2. <i>Fragilaria diopthalma</i> . | *10. <i>Tetragramma libycum</i> . |
| 3. ——— <i>rhabdosoma</i> . | ————— |
| 4. <i>Gomphonema Augur</i> . | 11. <i>Spongia acicularis</i> . |
| 5. ——— <i>clavatum</i> . | *12. ——— <i>Amphidiscus</i> . |
| 6. ——— <i>longiceps</i> . | ————— |
| 7. <i>Himantidium Arcus</i> . | 13. <i>Rotalia globulosa</i> . |
| 8. <i>Navicula pusilla</i> . | |

This small number contains two new species, and the *Rotalia* of the chalk, the lower shell of which is here abundant, indicates the marine or brackish origin of these animalculæ. Moreover the occurrence here of *Tetragramma Libyicum*, is remarkable, as being a form which a short time since was met with in saliferous earth brought from Siwa, in the Oasis of Jupiter Ammon, and at one time was found nowhere else.

As a general result of these researches, the following may be proposed:—

1. There are in Iceland as in North America, useful beds of good peat, consisting, in great part, even to as much as the $\frac{1}{3}$ of their bulk, besides vegetable remains, of dead microscopic animalcules—whilst the most common European good kinds of peat, although Infusoria when sought for are rarely found wanting in them, have not hitherto been found to contain them in the same proportion.

2. There is a minute organic invisible life diffused entirely through those parts of the soil rich in humus; but sandy situations of the earth's surface from near the South to the neighbourhood of the North Poles, and the bottom of the sea near the North Pole, are also filled with similar organic forms.

3. It is possible according to the method of research pursued by the author, to render evident the forms in which this life occurs, from the smallest particles of earth adhering to the plants in Herbaria, or to bodies of any kind; and to determine much further than has yet been done, with ease and scientific certainty, a more or less numerous fauna of microscopic organisms, from all parts of the earth.

XXIV. — CONTRIBUTIONS TO VEGETABLE EMBRYOLOGY, FROM OBSERVATIONS ON THE ORIGIN AND DEVELOPMENT OF THE EMBRYO IN *TROPEOLUM MAJUS*.*

By *Herbert Giraud, M.D.*

AFTER referring to the researches of MM. Schleiden, Wydler, Mirbel and Spach, and A. St. Hilaire, on this important point, Dr. Giraud states that he was induced to select *Tropæolum* as the subject of his own observations on account of its solitary ovula, and their compara-

* Abstract of a Paper read before the Linneæan Society, February 1st, 1842, and published in the Proceedings of that body.

tively large size, which render the individuals of this family, as well as the allied *Geraniaceæ*, peculiarly fitted for the purpose. He arranges his observations under seven general heads corresponding with as many progressive periods in the growth of the female organs, and extending from the completion of the anatropous development of the ovule to the perfect formation of the embryo; or from the commencement of the expansion of the bud to the complete formation of the fruit. The results are collected from a great number of dissections.

In the *first* period, or just before the expansion of the bud, a longitudinal section of the carpellum from its dorsum towards the axis of the pistillum, dividing the ovule, shows the latter to have completed its anatropous development. A portion of rather firm and dense cellular tissue enclosing a bundle of vessels descends from the placenta and in apposition with it to form the raphe, and terminates in the base of the ovule. The nucleus has only one integument, at the apex of which is the exostome or micropyle, opening close by and to the outside of the point of attachment; and the conducting tissue of the style may be traced into the carpellary cavity as far as the exostome.

In the *second* period, during which the expansion of the bud and the dehiscence of the anthers commence, and therefore before impregnation, a small elliptical cavity makes its appearance near the apex of the nucleus, having a delicate lining membrane formed by the walls of the surrounding cells: this cavity is the embryo-sac, and a minute canal may be traced leading from it to the exostome. The apex of the embryo-sac encloses at this period a quantity of organizable mucilage containing many minute bodies having the appearance and character of cytoblasts.

In the *third* period, the apex of the nucleus and of its integument becomes slightly inclined towards the placenta. The embryo-sac is much enlarged and lengthened; its mucilage has disappeared and given place to an elongated diaphanous utricule (*utricule primordiale*, Mirbel; *vésicule embryonnaire*, Meyen; *extrémité antérieure du boyau pollinique*, Schleiden;) containing a quantity of globular matter or cytoblasts. This primary utricule is developed wholly within the embryo-sac, from which it is obviously distinct.

The *fourth* period occurs after impregnation. The pollen tubes do not extend into the carpellary cavity; but the fovilla with its granules is found abundantly in the passage leading from the style to the exostome. With the increased development of the embryo-sac, the primary utricule elongates and becomes distinctly cellular by the development of minute cells in its interior, while at the extremity next the base of the

nucleus it is terminated by a spherical mass consisting of globular cells. The primary utricle at this period assumes the character of the suspensor (Mirbel), and its spherical extremity constitutes the first trace of the embryo.

In the *fifth* period the apex of the nucleus and of its integument becomes more inclined towards the placenta; the spherical extremity of the suspensor enlarges, and it becomes more evident that it constitutes the rudimental embryo. In the mean time the suspensor has become lengthened by an increase in the number of its cells; and its upper extremity is found to be protruded through the apex of the embryo-sac, the apex of the nucleus and the micropyle. From this extremity there is a considerable development of cells, many of which hang loosely in the passage leading to the conducting tissue of the style, while the rest unite in forming a process which passes down the outer side of the ovulum within the carpellary cavity. This process is composed of from nine to twelve rows of cells, and its extremity resembles in appearance and in the anatomical condition of its cells the spongiole of a root. By a slight traction of this cellular process the suspensor with the embryo may be withdrawn from the embryo-sac through the exostome, thus proving the continuity of the process with the suspensor, and through it with the embryo itself.

During the *sixth* period the suspensor becomes more attenuated; and the cellular process has reached the base of the ovulum, the cells of its extremity abounding with cytoblasts, which prove that it is still progressing in development. The embryo also increases in size, and two lateral processes are observed, which evidently form the first traces of the cotyledons.

In the *seventh* period all distinction between the nucleus and its integument ceases, and they form a single envelope enclosing the embryo-sac; the cellular process has become so much developed, that its extremity has passed round the base of the ovulum and is directed towards the placenta; and the lateral processes of the embryo have become distinct fleshy cotyledons, enclosing both the radicle and plumule in corresponding depressions of their opposed surfaces. The subsequent changes consist chiefly in the great development of the cotyledons, which ultimately occupy the entire cavity of the nucleus, filling the space usually taken up by albumen.

From these observations Dr. Giraud deduces the following inferences:—The formation of the embryo-sac and the development of cytoblasts within it having been shown to take place at a period prior to impregnation, and even the primary utricle itself making its appearance before

the emission of the pollen from the anther, and before the expansion of the stigma, the origin of the primary utricle cannot be referred to the influence of impregnation, nor can it have been derived from the pollen tube pressing before it a fold of the embryo-sac.

The primary utricle at its first formation being quite distinct from the embryo-sac, even at its apex (although brought into contact with it at a subsequent period, and ultimately penetrating it), cannot result from a depression or involution of the embryo-sac, as is maintained by M. Brongniart.

The pollen tubes (which after impregnation may be traced in the conducting tissue of the style) never reaching the micropyle, but pollen granules being found in abundance in the channel leading to it, and being doubtless brought into contact with the outer surface of the embryo-sac through the exostome; and the first trace of the embryo appearing at this time in the formation of the spherical body at the inferior extremity of the primary utricle—Dr. Giraud is led to conclude that the origin of this simple spherical body results from a peculiar process of nutrition, determined by the material or dynamic influence of the fovilla, conveyed through the medium of the primary utricle or suspensor.

The paper was accompanied by a series of drawings representing the ovulum of *Tropæolum* in the several stages of development described.

XXV.—CONTRIBUTIONS TO THE MINUTE ANATOMY OF ANIMALS.*

By George Gulliver, F.R.S., &c.

As minute anatomy is now become more generally interesting than formerly, and begins to assume the character of an extensive and comparatively accurate science, so as to give a new complexion to some of the most important questions in physiology and pathology, and to enable us to submit many old doctrines to a more exact scrutiny than most of our classical anatomists had the means of employing, it appears to me that considerable advantage might arise if different independent observers would more frequently publish a brief yet clear account of the results of their inquiries. Hence I propose to communicate occasionally to the Philosophical Magazine, a series of short notes on the ultimate structure of various animal tissues and on the elementary forms which occur in the fluids, taking the descriptions in all cases from my own observations, and frequently illustrating them with wood-cuts. It will thus be at-

* From the Philosophical Magazine, June, 1842.

tempted to give either a more precise account than we yet possess of some of the healthy and diseased parts of man and the lower animals, to present certain particulars of structure in novel physiological relations, or to record facts which may appear to have escaped the attention of previous observers : in short, to contribute summary and plain notes concerning numerous detached anatomical points which may perhaps be treated of as profitably in this manner as by set dissertations.

ON THE LYMPH-GLOBULES OF BIRDS.

It is well known that the blood of the vertebrate animals contains, besides the numberless red discs, a few pale globules which have very commonly been regarded as those of lymph. In birds, however, the globules which constitute the greater part of the juice of the lymphatic glands are generally rather smaller than the pale globules of the blood ; and, as I have noticed in the Appendix to Gerber's Anatomy, the same fact is observable in the mammalia. Yet the descriptions given since Hewson's time of the lymph-globules of birds have always been drawn from the pale globules of their blood.

The distinguished inquirer just mentioned, states that the particles of the fluid of the lymphatic glands of birds are oval, like the nuclei of their blood-corpuscles. In the Philosophical Magazine for February 1840, I gave an account of the lymph-globules of the Musk Deer, from which it appears that these scarcely differ in size from those of man, notwithstanding the blood-discs of this little ruminant are the smallest at present known ; and although the Camelidæ have oval blood-corpuscles, I found that the globules of the thymus, of the lymphatic glands, and of the pus of these animals, had the usual circular figure, and nearly the same size as the corresponding globules in other mammalia.* It was to be expected, therefore, that the lymph-globules of birds would possess a similar form, and this I have lately ascertained to be the case.

The lymph-globules of birds are commonly rather smaller than those of mammalia, yet this difference of size is not observable to the same degree in the pale globules of the blood of these two classes. The account of the chemical characters of the lymph-globules of mammalia, as given in the Appendix to Gerber's Anatomy, is generally applicable to the corresponding globules of birds. Professor Wagner observes, that the chemical properties of the pale globules of the blood and the nuclei of the blood-discs of birds and reptiles are identical. This appears to be true in most respects ; but in certain experiments the two

* See Medico-Chir. Trans., vol. xxiii ; and Lancet, 1840-41, vol ii, p. 101 .

kinds of particles seem to me to be differently affected under precisely the same treatment. Thus the nucleus of the blood-corpuscle is not so prone to change in drying as the lymph-globule. The former, whether exposed in recent blood by acids, or in dry blood by the moisture of the breath, may be quickly dried, and the form of the nucleus thus completely preserved, on the slip of glass used to make the observation; while the lymph-globule after similar treatment, and even if dried without any addition, becomes either faint, tumid, or misshapen. Certain saline solutions too, which, in a few hours, either injure the shape of the lymph-globules or render them almost invisible, do not act so remarkably on the nuclei of the blood-discs.

The pale globules noticed in this paper are those well-known white and slightly granular corpuscles which are generally seen at once very plainly in the blood, as they appear, under certain adjustments of the object-glass, with a distinct and dark circumference. But there are other pale particles in the blood. Some of these are isolated, and agree in all respects with the globules of the lymphatic juices, being smaller, often rather fainter and with a less definite contour than the pale globules first mentioned. In the blood after death there is also frequently observable small shapeless white fragments consisting of circular or oval granules hardly as large, seldom larger, than the globules of the lymphatic fluid; and minute oil-like particles are often seen in the fragments. In birds this granular matter often exactly resembles in structure the colourless fibrine, obtained from their blood by washing it in a linen bag, and the granules are frequently just like the nuclei of the blood-discs. The white granular matter is often abundant when the pale globules are either difficult to be found or entirely absent.

The following measurements of the lymph-globules are expressed in fractions of an English inch; the common sizes are first noted, then a space is left, after which the measurements of the small and large globules are given; and lastly, beneath the lines, the mean size deduced from the whole observations:—

1. Pigeon (*Columba Livia*, var.
Briss.)

1-6000
1-5333

1-7110
1-3800

1-5274

2. Song Thrush (*Turdus musi-
cus*, Linn.)

1-6000
1-4800

1-8000
1-3500

1-5090

3. Common Fowl (*Gallus domesticus*, Briss.)

1-6400

1-6000

1-8000

1-3200

1-52614. White Owl (*Strix flammea*, Linn.)

1-6000

1-4800

1-7110

1-4000

1-52275. Young Heron, half-grown (*Ardea cinerea*, Lath.)

1-5672

1-6400

1-4000

1-51506. Rook, (*Corvus frugilegus*, Linn.)

1-5333

1-6400

1-4000

1-50537. Jackdaw (*Corvus Monedula*, Linn.)

1-6000

1-8000

1-3555

1-52388. Starling (*Sturnus vulgaris*, Linn.)

1-5600

1-7110

1-3800

1-51529. Jay (*Garrulus glandarius*, Flem.)

1-6000

1-4000

1-3600

1-6400

1-3200

1-441410. Magpie (*Corvus Pica*, Linn.)

1-6000

1-5333

1-4800

1-6400

1-3555

1-5001

Pale globules of the blood.

1-4000

1-3200

1-5333

1-2666

1-355511. Greenfinch (*Fringilla Chlo-
ris*, Temm.)

1-6000

1-4800

1-6400

1-3555

1-4924

12. House Sparrow (*Fringilla domestica*, Linn.)

1-6000

1-4570

1-6400

1-3200

1-468213. Yellow Bunting (*Emberiza Citrinella*, Linn.)

1-5333

1-4572

1-6400

1-3200

1-4572

These measurements, excepting No. 5, were obtained from the particles of adult birds at different seasons. The lymph-globules in most of the above-named species, do not differ much in magnitude; and it is possible that further observations may show as much variety in the size of the globules of any one bird, especially if examined at different periods and compared in growing and mature specimens. In a few instances from one to five of the globules were seen to be inclosed with granular matter in a cell, the diameter of the latter varying from 1-2600th to 1-1114th of an inch. If the lymph-globule be regarded as a cell-nucleus, of course the smaller rounded particles which it frequently contains will be nucleoli. Sometimes from two to six of these may be observed in one lymph-globule, in which case they are very minute; and it is not unusual to see a single central and larger nucleolus varying from a quarter to half the size of the lymph-globule.

Extracts and Abstracts from Foreign Journals.

[From *Schlechtendal's Linnæa*, 1842.]

Mohl on the Structure of the Punctated Vessels of Plants. (Continued from p. 122.)—Under these circumstances the question arises, — Shall we consider all the before mentioned forms of vascular tissue as *true punctated vessels*, or shall we thus alone regard those which possess on all sides dots surrounded with a circle, looking upon the others as *mixed vessels*; or rather, ought we to make new and special divisions of vegetable ducts in order to embrace the different varieties and appropriate to them names? The first proposition appears to be the best; for on the one hand they have a common character in the possession of a dot surrounded with a circle, and which easily distinguishes them from other vessels, and on the other hand the presence of which is on the whole correlated to a dicotyledonous embryo. [After alluding to reasons why the other propositions should not be followed, the author thus proceeds.]

In order to investigate the nature of the punctations, the best plant to examine is *Cassya glabella*, as in this they are very large. In this

plant with delicate transverse or longitudinal sections, it is easily seen that the circle of the dot proceeds from a hollow or excavation between the contiguous parietes of the vessels; and the dot, or point, itself is a canal having a tender membrane at its outer end running from the interior of the vessel towards this hollow.

[The author then alludes to varieties resulting from pressure, different appearances of the canal and circle resulting from different sections, &c.] Besides these dots which have a circle, there are others as we have before remarked, met with in a great many plants which are devoid of it. A due examination, especially with transverse or oblique sections of the vessels, shows that between these dots and adjacent lying organs there is no hollow or excavation, but that the dot is formed by a simple gap or chasm of the secondary layer of the tube, and therefore completely simulates the dots of parenchymatous cells, and of reticulated and scalariform ducts.

In punctated vessels septa may be found under two forms. A greater portion of the original partition, having a round hole in its centre, remains, or else the partition is broken through by several contiguous transverse spaces, so that they appear like the walls of scalariform ducts. The former kind may be found in *Cassyta glabella*, &c.; the latter in *Ilex aquifolium*, &c.

Concerning the development of these vessels we may remark, that in their earlier period of evolution they appear like the other vessels, as rows of large cell-like completely closed tubes, the membrane of which is thin and homogenous and each contains a nucleus. Afterwards a delicate fibrous net is observed on their walls, especially on those which lie next to other vessels. Their further development shows that this net does not depend upon secondary fibres on the inner surface of the wall of the vessel, but that the meshes of the net answer to the after circles of the dots and to indicate the hollows or excavations which lie between the vessels, and that the distinct fibres which surround the meshes are formed through the position of the vascular parieties which remain in connection with adjacent organs.

[From *Valentin's Repertorium*, 1841.]

Van Beneden on Alcyonella.—The author remarks that in the same polypoid aggregation both male and female animals exist. The testicles of the former, like the ovaria of the latter, are placed behind the stomach. The seminal animalcules leave the testicles and spread themselves through the interior of the Polyps. The number of males is far less than that of the females. In the interior of the body a circulation is carried on by means of the motion of cilia. The skin, as also the external surface of the intestines are apparently provided with cilia. At the base of the tentacles appears a row of openings for the entrance of water into the interior of the body. The nervous system is apparently composed alone of a single ganglion placed above the œsophagus. The young creatures live in a free and isolated state, have a very rapid

motion produced by cilia, and simulate Planaria; in this condition they may also be found within the Polyps, and it was remarked in the examples under observation, that every two were enveloped in a sort of case. Several Polyps contained as many as six intestinal worms around the canal.

Rathke on Actinia plumosa.—Milk-white mucoid filaments were observed to pass out of the tegumentary pores, which glistened, moved sometimes for a long period in a circle, and contained crystals and granular mucus.

Kobelt on Trichina spiralis.—This parasite was found in all the transversely striated muscles, except of the heart and the small muscles of the ear, in a dropsical man of weak intellect, and of seventy-three years of age. None were found in other organs. Generally each cyst contained one worm, more rarely two, and very seldom three, and but rarely they possessed none. *Bischoff* submitted the worm to microscopic examination; according to him it lies always in a double cyst. The external one is of a citron shape, the internal is oval and does not proceed into the poles or ends of the external covering. In other respects the coverings are close together. The poles of the outer cyst, which is $\frac{1}{50}$ th of an inch long, and $\frac{1}{95}$ th broad, are filled with small dark granules possessing a particular motion when free. The inner cyst measures $\frac{1}{77}$ th of an inch, and contains a more or less granular mucoid fluid, which is sometimes clear at others not; in the latter case the worm cannot be observed. The walls of both cysts are composed of a firm homogenous slightly granular texture. The worm lies rolled up in a spiral manner, is from $\frac{1}{25}$ th to $\frac{1}{30}$ th of an inch long, and from $\frac{1}{100}$ th to $\frac{1}{500}$ th broad, it continues alive very long, even in decomposing muscles. In the cyst it remains quiet, but out of it, in water it unrolls and rolls itself up again. An oral and caudal aperture were not to be seen. The tubular intestine appears to commence at the blunter or head-like extremity with a narrow oesophagus, in the larger portion of the body to occupy the whole space and have constrictions at intervals, whilst inferiorly it is more tubular and runs in a zigzag direction. It contains a granular mass, and moves rhythmically backwards and forwards. Often a small dark spot is observed at the interior portion of the body, this which is granular is the ovarium. Sometimes after pressure a tube is discernable which perhaps is an oviduct. In the middle of the body runs a longitudinal stripe, either a vessel or a nerve. The following characters of the genus and species is given by the author:—

Trichina.—Animal pellucidum, filiforme, utrinque, postice magis, quam anteriorum adtenuatum; ore et ano discreto dubis, tubo intestinali et ovario instructum. In vesica duplici externa dura et elastica continens alteram, in qua entozoon plerumque solitarium.

T. Spiralis T. minutissima spiraliter, raro flexuose incurva, capite obtusa, collo nudo, cauda adtenuata, obtusa. Vesica externa elliptica, extremitatibus plerumque adtenuatis interna ovalis.

[In our next number will be found some critical remarks of Valentin upon the above.]

[From the *Medicinische Zeitung*, 1842.]

Simon on the presence of living Animals in the Tubercles of Acne punctata.—It is generally believed that the tubercles of *Acne punctata* have their seat in the sebaceous crypts of the skin, but according to M. Simon, they more particularly effect the piliferous bulbs. He is led to this opinion from the fact of hairs being often present in the matter squeezed from them, even as many as fourteen having been observed.

Another peculiarity not less interesting is the existence of living animals in the same matter. These microscopic animalcules (of which our author has examined as many as forty individuals) have ordinarily a length of $\frac{1}{600}$ th to $\frac{1}{900}$ th of a line, and a breadth of $\frac{1}{200}$ th. At the anterior portion of the body four pairs of feet, each foot having three articulations, are seen, the first articulations being provided with three delicate uncini. On the posterior portion of the head exists two bi-articulate mobile organs, between which is a sucker having two bristles. The posterior portion of the body is ordinarily very much elongated, and rounded at its termination, whilst in a few instances it is shorter and ending in a point.

According to the entomologists of Berlin, these creatures are *Acari* in the primary period of their development. The presence of them according to M. Simon, is not always constant in the disease under discussion.

In order to examine them, the matter prepared from the tubercles must be spread out by compression between two plates of glass, but in doing so care must be taken that the animals are not crushed, and the better to prevent which is, to place two delicate stripes of caoutchouc between the plates near their edge. In this manner they may be preserved alive several hours in a drop of oil, and their movements studied by aid of the microscope.—No. 9.

[From the *Journal de Pharmacie et de Chimie.*]

Soubeiran and Henry on the adulteration of Milk.—It has lately been widely promulgated that a new method of adulterating milk has been adopted by adding to it, after the cream has been removed, a certain quantity of the brain of the calf or sheep. This was afterwards denied by the paper that at first announced it, but failed to quiet a great portion of the population of Paris, as the use of milk is almost universal. It was therefore necessary to destroy this false impression, and became urgent to find out means for the detection of the adulteration, supposing that it was effected in a single instance. In a memoir on this subject, read at the Academy Royal of Medicine by Gaultier de Claubry, several characters were given, derived from the physical properties of adulterated milk, compared with those of unadulterated liquid, as seen under the microscope as well as from analytical inquiry. Charged conjointly with Rocheux to make a report on the subject, we have been able to establish the exactitude of the greater portion of the assertion of G. de Claubry, but at the same time it has been very evident to us that the procedures offer in their execution some difficulties,

when we take into consideration that a microscope is not always at hand, and that every body is not familiar with difficult and complicated chemical manipulations.

When the brainy matter of the sheep or calf is added, either directly to the milk, or in emulsion with water in the proportion of 5 per cent the physical properties of the milk, its odour, savour, colour and density, are not so notably altered as to allow the adulteration to be at once perceived, and which is therefore happily without danger as respects the animal economy. But seen by the aid of a good microscope, under an amplification of from 300 to 500 diameter, fragments of tubes, of torn rugose membrane, sometimes even sanguiferous vessels are observed by the side of the ordinary milk globules, the former being very different from the yellowish amorphous masses presented by milk after it has been boiled, or from that which is mingled with *colostrum* shortly after an animal has given birth.

Nevertheless it must be owned that these characters are not always so evident, and further the illusions which the microscope presents to those not very familiar with its employment are so frequent, that observers may be very easily led into error. We therefore prefer having recourse to a method founded on the property which the oleo phosphoric acid possesses,—and which as shown by Fremy exists in the brain—of changing under the influence of acidulated water, into oleine and phosphoric acid.

[From the *Pharmaceutical Journal*.]

Pereira on the Structure of Amylaceous Matters.—Several feculent amylaceous or starchy substances are extensively used as food and medicine, and for other purposes. In commerce the cheaper are sometimes substituted for the more costly kinds, but the microscope offers a ready means of distinguishing the fraud. Particles of starch are organized substances. Their size is subject to considerable variation. The *tous les mois* obtained from a species of *Canna* has the largest sized particles; the Portland arrow-root from *Arum maculatum*, a very small particle. The shapes are also different; some are circular as wheat starch; others are elliptical or ovate as *tous les mois*; some are mullar shaped as Tapioca arrow-root, Brazilian arrow-root, and Tapioca. All have on some part of their surface a small circular spot called the *hilum*, and present an appearance of rings or rugæ, which depend on the concentric layers of which each grain is composed.

[From the *Comptes Rendus*, 1842.]

Gruby's Anatomical Researches on a Cryptogamic plant constituting the true Muguet of Children.*—The greater number of pathologists consider the pseudo-membranous production in *muguet* a consequence on idio-

* *Muguet* a pellicular disease occurring in the mouths of children.

pathic inflammation; others, on the contrary, affirm that the inflammation is of a symptomatic character. Opinions are also divided in respect to the transmission of this disease: some contending for its contagious nature, whilst others firmly deny that it is so.

Muguet shows itself under the form of white patches covering the entire mucous membrane of the mouth, and extending sometimes to the pharynx, œsophagus, stomach, and small intestines. At its commencement the disease is characterised by small conical whitish elevations, of 0.25 of a millimeter in diameter, dispersed over the buccal mucous membrane; these elevations, in a short time, continue to enlarge, and extend rapidly under the form of a false membrane firmly adhering to the subjacent tissue, having a thickness of from two to three millimetres, and covering sometimes the whole extent of the digestive canal.

A portion of this substance on being submitted to the microscope, shows that it is solely composed of a mass of cryptogamic plants. In order to study the characters of these vegetables, and perceive their relations to the tissue on which they grow, it is necessary to examine one of the isolated cones to be found towards the onset of the disease. Each of these cones is composed of a multitude of individuals provided with rootlets, ramifications, and sporules.

The rootlets are implanted in the cellules of the epithelium; they are cylindrical, transparent, about the $\frac{1}{400}$ th of a millimetre in diameter; in being developed they perforate the entire series of cellules composing the epithelium, to arrive at the free surface of the mucous membrane.

The stems growing from the surface of the epithelium are equally transparent, divided at different distances by partitions, and enclosing corpuscles in their interior; they are cylindrical, straight, of a $\frac{1}{4}$ th of a millimetre long, and $\frac{1}{400}$ th of a millimetre in breadth: the stems divide into branches or ramifications, which subdividing bifurcate at an acute angle. These ramifications are composed of very distinct oblong cellules, enclosing one, two, or three, round and transparent nuclei; their lateral parietes present here and there sporules, and their extremities particularly, a very great number. The diameter of these sporules is from the $\frac{1}{200}$ th to the $\frac{1}{500}$ th of a millimetre.

These Cryptogamic plants bear a great analogy to the *Sporotrichium*, described by several botanists.

As they are very fragile, they become detached by the movements of the organs of the mouth, and mixing with the food, are carried into the digestive canal where they frequently germinate and cover a considerable surface; children in whom the extension of this disease is great, fall into a state of marasmus, and generally sink under it. As we have constantly met in this white substance of *muguet* nothing more but vegetables and cells of epithelium, and no product of inflammation, we consider it fair to conclude that this disease is produced entirely by the growth of a cryptogamic plant on living mucous membrane.

These low vegetable forms offer a great analogy to the *Mycodermata** of *Tinea favosa*; but they differ in the following characters:—

* See the figures and Mr. Busk's "Observations on Parasitical Growths on living animals." Microscopic Journal, Vol. I, p. 148.

1. The *Mycodermata* of *Tinea favosa* are contained in proper capsules; the *Cryptogamia* of *Muguet*, on the contrary, are developed on the surface of the epithelium, and not in capsules.

2. In the *Mycodermata* the moniliform ramifications are transformed into sporules, whilst in the *Muguet* the sporules are developed on the sides of the ramifications.

3. The cellules of *Mycodermata* are not well developed and do not present internal nuclei; on the contrary those of *Muguet* have very distinct nuclei.

4. The ramifications of *Mycodermata* are curved, whilst those of *Muguet* are rectilinear.

5. The ramifications of *Mycodermata* do not possess cellules at the point where they are given off from the stem, whilst those of *Muguet* present them.

Exposed to atmospheric air, the cryptogamia became dry, their cellules become slightly rugose and more transparent; in drying them with the epithelium in which they were developed, the rootlets can be followed to their very extremities; in water they swell; in milk they may be preserved as in water, without becoming more developed; by maceration in water they do not alter; after the death of the individual these vegetables do not undergo any change until the period when Infusoria become developed and destroy them by degrees.—3rd May.

Léveillé on the genus Sclerotium.—In this memoir the author enumerates the great number of species that have been comprised in the genus *Sclerotium*, and shows that this supposed genus is formed of individuals of a different nature which ought not to be found united.

The genus *Sclerotium* may be divided into four sections. The first comprehends those pathological alterations produced by insects or parasitic Fungi; the second, Fungi in the act of growth or arrested in their development; the third, species belonging to other genera which have served to form new ones; and the fourth, species nothing else whatever but varieties.

In considering the place in Mycological classifications, which *Sclerotium* ought to occupy, he shows by observations that it is decidedly misplaced, because it forms imperfect beings, mere sketches of vegetation, presenting no trace of organs of fructification, and which in spite of that, under the influence of given circumstances, vegetates afresh and produces perfect Fungi.—Thus the *Sclerotium fungorum* gives birth to the *Agaricus parasiticus*, the *Sclerotium lacunosum* to *Agaricus racemosus*, *Sclerotium pustula* to *Peziza Candolleana*, *Sclerotium durum* to *Botrytis cinerea*, &c. These facts established upon a large number of observations, are in a measure verified by other similar ones taken from Rumphius, Micheli, Tode, Corda, &c.

He at length compares *Sclerotium* to other equally barren modifications of the fungoid tissue, and he endeavours to show that these productions are only forms of mycelium or the primitive element of Fungi

caused by the situation in which they are developed and by the excess or the want of action of air, light, humidity, and temperature.

He distinguishes four forms of *Mycelium* :—

1. The Filamentous or Nematoid *Mycelium*, composed of white or coloured chambered filaments, anastomosing with each other; these form the genera *Athelia*, *Hupha*, *Himantia*, &c.

2. The Membranous or Hymenoid; exhibiting membranes of a greater or less degree of thickness known by the names of *Racodium* and *Xylostroma*.

3. The Tuberculous or Scleroïd, the principal subject of this memoir.

4. The Pulpy or Malacoïd, which is fleshy, soft, and found in the genera *Phlebomorpha* and *Mesenterica*.

The following are the conclusions to which he arrives :—The greater number of Fungi proceed from a *Mycelium* which appears to be a particular kind of vegetation or evolution of spores. This *Mycelium* presents itself under four principal forms; it is often long lived, and vitality can be suspended in it for a greater or less time, and made to appear under the influence of favourable circumstances. Endowed with this power, it is manifest, nature has reserved it as a means of reproduction and preservation of the species.

The genus *Sclerotium* is but one of these forms; it ought not therefore to be considered a genus. It is the same with *Acrospermum*, *Rhizoctonia*, *Fibrillaria*, *Himantia*, *Athelia*, *Hypha*, *Rhizomorpha*, *Mesenterica*, &c.

All Fungi, and every myceloid tissue, under whatever aspect it presents, are but individuals either in the act of growth or arrested in their development.

These productions are far from being perfectly known. The time has not yet arrived to efface them from the history of Fungi; on the contrary, they merit more than ever the attention of Botanists because they are natural experiments of which unexpected results may be obtained on the reproduction of Fungi.—21st March, 1842.

[From the *Annales des Sciences Naturelles*, 1841.]

Milne Edwards on the existence of Sexes in Æquorea violacea.—In this species, as in others of the same genus, hitherto described by zoologists, there is to be found at the inferior surface of this animal of the family of *Medusa*, called *Cryptocarpia*, a number of membranous lamellæ, arranged in a radiated manner around the stomach, and corresponding to the canals described as passing from that viscus to the border of the expansion (ombrelle); they occupy however only about three quarters of their length, as they do not commence immediately at the margin of the mouth, and terminate at a sufficiently distinct distance from the border of the expansion (ombrelle). Two of these lamellæ are suspended in a parallel manner below, each of these tubes similar to a riband folded upon itself, as would make it appear double. Seventy-four of these double radiated lamellæ may consequently be counted,

which are free at their inferior margin, and plaited on either side; a great number of oblique striæ may also be seen, of a violet colour, and on submitting them to the microscope, M. Edwards is convinced they constitute the sexual apparatus of these *Acalephæ*. Thus, in some he has met with granules having all the appearance of ovules, and in another individual, where these bodies did not appear the same, he saw a multitude of zoosperms escape, which were extremely lively, and analogous in their form and movements to the spermatric animalcules of the Aureliadæ, and various other Mollusca. It therefore appears evident these lamellæ are either ovaries or testicles, according to the individuals examined, and that in relation to the reproductive organs, the *Æquoridæ* differ from the ordinary *Medusæ*, not because they are deficient of a special generative apparatus, or that it is concealed, but solely by the external position and arrangement of the sexual organs; among the *Acalephæ* named *Phenerocarpia*, these organs are deeply imbedded among the roots of the prolongation of the mouth, and enter into the composition of the walls of the stomach; whilst among the *Æquoridæ*, which have received the name of *Cryptogamia*, these very organs are altogether distinct from the central digestive cavity, and freely float at the external part under the inferior surface of the expansion (ombrelle).—*October*, p. 198.

Milne Edwards on the Microscopic Examination of the Tissue of some Acalephæ.—In his description of *Beroë Forskalia*, it is stated, that on subjecting the tissue of *Acalephæ* to the microscope, a multitude of extremely delicate filaments may be seen crossing each other in various directions, and which might possibly be of a muscular nature. There also exists(?) near the surface of the body, an immense number of pyriform corpuscles terminated by a sort of tail, very slender and very much resembling those covering the skin of certain *Medusæ*, whose office is probably that of secreting organs. M. Edwards imagines these small glands might be the source of that phosphorescence so well known in the genus *Beroë*; but on carefully examining this luminosity it appeared to proceed principally from the vicinity of the ciliated margins, whilst it is in the interval comprised between these margins that the pyriform granules are found. The light given out by these animals, had been noticed by Forskal and more recently by Rolando; it is of a greenish hue, and is sometimes very vivid; to cause the animal to emit it, excite the same by mechanical irritation; but when the discharges rapidly succeed each other, their intensity becomes very much diminished.—*October*, p. 215.

Eschricht on the Diceræ rude of Rudolphi.—Several of these Entozoa were voided by the little girl of M. Grove, physician at Rænne in the island of Bornholm, some months since, and sent to Professor Eschricht for examination. He considers it to be truly one of the Entozoa, which may be or not adapted to Rudolphi's system, and describes it as being in every respect analogous to that described by Sultzner of Stras-

burgh in 1801, and by Dr. Lesauvage of Caen in 1818 (Bulletin de la Faculté de Médecine de Paris, tom. vi, p. 115). How is it, asks the author, that this worm, found but twice in large quantity, has not been met with more frequent, viz., near to Strasburgh in 1801, and on the Island of Bornholm in 1841? It is this which is very difficult to explain, especially by myself and others, who do not advocate spontaneous generation.—*December, p. 355.*

Necrology.—In the December number of the Annales for the year 1841, will be found the biography of the late JEAN VICTOR AUDOUIN, and discourses on this much lamented and distinguished naturalist, by M.M. Serres, Chevreul, Milne Edwards, and Blanchard; to which is appended a chronological list of the zoological writings of this respected observer.

M. Edwards has also detected in the interior of *Stephanomia prolifera*, with the assistance of a powerful microscope, an innumerable quantity of very active white corpuscles of a pyriform shape, and terminating in an extremely fine tail; the movements were in every respect those of spermatie animalcules, and it was impossible for him to consider them in any other light than true zoosperms. He likewise describes ovoid capsules, grouped near to the pyriform sacs, which he calls *testicles*, thereby endeavouring to show that these singular animals are provided with male organs.—*October, p. 228.*

Leon Dufour on the Metamorphoses of the Cecidomyia of the Sea Pine and Poplar.—An interesting paper to the Entomologist, with several microscopic remarks.—*October, p. 257.*

Sars on the Development of Acalephæ (Medusa aurita and Cyanea capillata).—The following are the most important results arrived at by the author connected with this class of animals:—1, Spherical eggs contained in ovaries, on which may be observed the vesicle of Purkinje, the spot (vesicule) of Wagner, and on which the *jaune* offers the division or ordinary bifurcation, give birth to young of an oval or cylindrical-oval form, furnished with vibratile cilia, contained during a certain period of their development in numerous receptacles, which form at the same time in the four arms surrounding the mouth of their parent.—2, Shortly, these young quit their parent, and swim for a certain time similar to Infusoria; they then soon fix themselves by one of their extremities to a foreign body, on which they grow, whilst at the other extremity they are free; a mouth is situated at the free end, and around this opening a row of tentacles is formed.—3, In this polypoid state, which may be considered that of a larva, these animals are capable of propagating by budding similar to Polyyps, that is to say, by gemmæ and stolons: new animals produced by these means closely resemble the primitive larvæ.—4, Lastly, after an indeterminate space of time, the larva divides spon-

taneously into a number of transverse segments, all of which become new animals. The latter (not resembling the larvæ) are free, swim in every sense of the word, and have a disc-like body, the periphery of which is divided into eight bifurcated rays at their extremities; they have a quadrangular mouth, in the form of a pendent tube, &c. As they increase in size, the rays become shorter and shorter; in the mean time the intervals between the rays increase in extent, and give rise to marginal tentacles; to be brief, these animals become perfectly identical with their original parent (the *Medusa* or *Cyanea*). It is not then the larva or the individual developed in the egg, which becomes changed into the perfect *Acalepha*; but the small ones formed by the transverse and spontaneous division. This metamorphosis cannot be better compared than to the development of the *Salpa*, although offering many points of difference. The numerous observations of the author, made during last autumn, convinced him that Chamisso has given every necessary insight into their development. The *Salpæ* resemble the *Acalephæ*, in the particular, that it is not the larva, but the young of the larva which become perfect animals: it is not the individual, but the race is changed. The author, in conclusion, refers particularly to the observations of Graham Dalyell (Edin. Philos. Journ., Vol. XXI, 1836) as confirmatory in part of several of his observations.—*December*, p. 343.

Quatrefages on the Anatomy and Physiology of Synapta Duvernæa.—

The genus *Synapta* was established by Eschscholtz for those Holothuridæ with very delicate integuments, deprived of respiratory organs, and possessing the property of adhering to foreign bodies in a similar manner to the heads of *Bardanus*. It has been adopted by Jæger and all succeeding naturalists. All the species of this genus hitherto known, have been discovered in the Red Sea, or in the seas of Asia and America. The presence then of these animals in our seas (the Islands of Chausey, and on the coasts of La Manche) is alone an interesting fact in Zoological Geography.

The portion of this memoir which, had it not been so lengthy, it was our intention to insert related particularly to the minute Anatomy and Physiology of this interesting animal; to proceed with order in the study of the several parts of the body of this *Synapta*, named by M. Quatrefages *S. Duvernæa*, we had intended examining them successively in the same order they are given in the original paper, viz.:—1st, the integuments,—2nd, the trunk,—3rd, the digestive apparatus,—4th, the organs of circulation,—5th, those of respiration,—6th and lastly, those of generation. We must, however, refer our readers to the original paper for the many interesting facts brought to light by the employment of the microscope when examining the several tissues of this animal, especially as we cannot conveniently give at present the numerous illustrations accompanying the memoir.—*January*, 1842, p. 19.

Remak on the Production of the Blood-globules.—In the blood of chicks during the third week of artificial incubation, I found blood-corpuscles, some of which were round, some pear-shaped and stalked,

and some *biscuit*-shaped, with their large ends coloured red, and containing each a nucleus. These two nuclei were collected together by a thin process, which traversed the uncoloured and canal-shaped intermediate portion of the corpuscle. The nuclei of the stalked corpuscles also exhibited a process corresponding to the peduncle of the corpuscle. These observations, therefore, render it probable that in these instances an increase of the corpuscles is effected by means of *division*. The corpuscles of the embryos of pigs an inch long were four to six times larger than those of adult pigs; they exhibited double or quadruple nuclei, which probably belong to different divisions of the blood corpuscle marked by pale intermediate lines.

To observe the reproduction of the blood corpuscles after losses of blood; thirty pounds of blood were drawn from a horse, and a part of it when examined was found to contain besides the well known corpuscles without nuclei, only a few pale lymph-corpuscles, as they are called. On the following day the latter were found in enormous quantities and much enlarged; and in their interior they exhibited one or more pale reddish globules of the size of blood-corpuscles, covered by the granular contents. On succeeding days these globules appeared the more red the more the granular contents of the parent-cells (for such the pale lymph-corpuscles proved to be) diminished, and the thinner their membrane became. On the fourth day, there could be no doubt, that the red blood-corpuscles form within the enlarged pale cells, and become free by the disappearance of the latter. The blood of the horse became, as further experiments showed, the more coagulable, and the thickness of the buffy coat become the greater, the more blood was drawn; but the buffy coat in such a case consisted of but little coagulated fibrine, with an excessive quantity of the parent-cells of blood-globules.

I have confirmed these results in near about forty times. Between the fourth and eight days after the first considerable abstraction of blood, even during inflammatory and typhous diseases, the commencing regeneration of blood-corpuscles is seen in the appearance of parent cells, which, as in horses, in consequence of their low specific gravity, are chiefly found in the coagulum of the buffy coat, of which indeed they form a considerable part. My present investigations lead me to expect that I shall succeed in finding easily discernable physical differences between the buffy coats formed by an excess of parent cells, and those which consist chiefly of coagulated fibrine, and which are the results of the great specific gravity of the blood-corpuscles causing them to sink in slowly coagulating blood. I shall at present only say, that the looseness of the buffy coat is generally the consequence of an excess of new parent-cells. A buffy coat, which appears five days, or perhaps even a shorter time after the first bleeding, can never be a true sign of inflammation.

With respect to the production of the pale parent-cells, my present investigations render it probable that they are generated, not within the blood, but in the cells which line the walls of the blood-vessels and lymphatics, but experiments in which I am now occupied will determine this.—*Medicinische Zeitung*, July 7, 1841, quoted in *Brit. and For. Med. Rev.* Jan. 1842.

On the Organs that Secrete the Perspiration.—A letter was read from M. Giraldis, at the meeting of the Academy of Sciences, on the 16th August, 1841, on the glands secreting perspiration. After mentioning that they were first described by M. Breschet, in his pamphlet on the skin, and enumerating the different German authors that have taken notice of them in their works, he proceeds to state the situations in which they can best be seen. They are visible over all the skin, but are most numerous in the following places, viz., the palms of the hands, the soles of the feet, the armpits, and the *mon veneris*. They are not formed by tubes which divide at their extremity, but by a narrow canal, which penetrates the skin, and runs sometimes to a considerable distance in the fatty tissue beneath. At the extremities of the fingers, they appear entirely to cross it. They sometimes divide, but generally they are rolled upon themselves, forming little masses, which have been taken for the termination of the glandular structure. It is easy to see the tubes forming these little masses on a piece of skin properly prepared. Such is the kind of organ, according to M. Giraldis, in the human species, for the secretion of the perspiration, and which is analogous to the elementary glands of insects.

The general plan at present in use for examining the skin, viz., by removing from it all the fatty tissue, is one which must always lead to negative results, as the termination of the glands, always situated in that tissue, must of course be removed; another fatal mistake is the employment of too thin sections of skin, as the tubes are thus completely cut, and it must be by the greatest chance, if we can preserve in the same position the entire canal with its terminations. The skin ought to be prepared in the following manner:—The part should be taken from the palm of the hand, or sole of the foot, along with the fatty substance beneath it, and macerated for 24 hours in nitric acid diluted with two parts of water; it should then be removed, and macerated for the same length of time in pure water; a section of the thickness of a millimetre, should then be made, and subjected to a slight pressure between two plates of glass. The skin, thus prepared, becomes transparent, and the prolongations which line the canals, of a yellowish colour, thus making the tubes very distinct. By this way, we can examine the form of the papillæ, and the tissue which composes them.—*Abridged from the Gazette Medicale de Paris, Aug. 21, 1841, in Lond. and Edin. Month. Journ. Med. Soc., Nov. 1841. p. 823.*

May 26th, 1842.—Professor Lindley, President, in the Chair.

THE following communication, originally read before the Chemical Society on February 1st, 1842, was, at the request of the Council, laid before the Microscopical Society, as being likely to attract the attention of Microscopists to the field of Chemistry for research.

“On the change of colour in the biniodide of Mercury.”—By ROBERT WARINGTON, Esq. The author after describing the method of preparation, and the well known change of colour which takes place when

the scarlet biniodide of mercury is subjected to the influence of heat and sublimed, and the passage of the yellow resulting crystals back to the original scarlet from various causes, details a series of most interesting microscopic observations on this subject from which he concludes that the resumption of the scarlet colour is owing to a series of changes taking place, which separate, to a certain extent, the laminae of the crystals from each other, that this is determined more rapidly by mechanical disturbance of the surfaces from various enumerated causes, and that the yellow colour can be again produced, without materially altering the form, by carefully fusing together the separated plates of the altered crystals by a rapid application of heat. The author also states that when the heat is gradually applied a mixture of red and yellow crystals are produced, each having its proper and distinct form, but if suddenly submitted to a higher temperature, nothing but the yellow crystals result, proving that this compound is dimorphous, and has two distinct vapours at varying temperatures.

Mr. W. then goes on to investigate the changes of colour which take place when the biniodide is formed by precipitation from solutions, and finds that the yellow powder which at first appears, is in the form of the sublimed yellow crystals, and that these are after a short time redissolved slowly producing the formation of red crystals of the same shape as those obtained by the gentle application of heat to the dry compound; a phenomenon new in the subject of crystalization, and highly interesting. This paper was illustrated by drawings of the crystals taken from the microscope by the camera lucida. The powers employed were 250 and 620 diameters.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

March 3rd, 1842.—J. F. Bergin, Esq., President, in the Chair.

THE Secretary having read the proceedings of the last meeting,

Mr. Allman read a very interesting paper on the reproduction of Entozoa.

Mr. Grubb exhibited a block of pine wood, which had formed part of a pile taken up from the bed of the Shannon, near Tarbert, where it had been lying for five years;—it was found penetrated by numerous tabular canals of *Teredo navalis*, and was rendered completely cellular by *Lemnoria*.

Mr Callwell presented some specimens of minute Algæ, *Calathamnium Corymbosa*, &c.

Dr. Hill exhibited several specimens of minute arterial injections of the human kidneys.

April 14th, 1842.—T. F. Bergin, Esq., President, in the Chair.

THE Minutes of last meeting having been read—

Mr. Callwell mentioned that he had obtained specimens of minute Algæ which had grown on a solution of Iodide of Potassium.

Mr. Bergin exhibited an instrument invented by him for the purpose of illuminating transparent objects, and promised a communication on the subject.

The Society was occupied during the remainder of the evening in testing the powers of Mr. Bergin's invention, and the result was deemed highly satisfactory.

Microscopical Memoranda.

Kippist on the existence of Spiral Cells in the Seeds of Acanthaceæ.—After briefly enumerating the other natural families in whose seeds spiral cells had been previously observed, the author proceeds to describe those of a plant brought from Upper Egypt by Mr. Holroyd (*Acanthodium spicatum*, Delile), whose peculiar appearance when placed under the microscope, first led him to examine those of other *Acanthaceæ*, in which family the existence of spiral cells had not been noticed. The entire surface of the seed in *Acanthodium* is covered with whitish hairs, which are appressed, and adhere closely to it in the dry state, being apparently glued together at their extremities. On being placed in water, these hairs are set free, and spread out on all sides, they are then seen to be clusters of from five to twenty spiral cells, which adhere firmly together in their lower portions while their upper parts are free, separating from the cluster at different heights, and expanding in all directions like plumes, forming a very beautiful microscopic object. The free portions of the cells readily unroll, exhibiting the spire formed of one, two, or occasionally of three fibres, which may sometimes be seen to branch, and not unfrequently break up into rings. Throughout the whole length of the cell the coils are nearly contiguous; in the lower part they are united by connecting fibrils, and towards the base of the adherent portion become completely reticulated. The testa is a semi-transparent membrane formed of nearly regular hexagonal cells, whose centre is occupied by an opaque mass of grumous matter. Those cells which surround the bases of the hairs are considerably elongated, and gradually tapering into transparent tubes, appear to occupy the interior of the spiral clusters. Some of these appearances were noticed by Delile, who described the *Acanthodium* in the splendid work on Egypt, published by the French Institute, where also a slightly magnified figure of the seed will be found, but without representing the spiral cells, which Delile does not appear to have detected.

Two species of *Blepharis* are mentioned as possessing a structure very similar to that of *Acanthodium spicatum*, differing chiefly in the smaller and more uniform diameter of the spiral cells, and in their thicker fibre, which is always single and loosely coiled.

The seed of *Ruellia formosa* on being placed in water develops from every part of its surface single short thick tapering tubes, within which in some cases a spiral fibre is loosely coiled; whilst in others the place of the spiral fibre is supplied by distant rings.

In the seeds of *Ruellia littoralis*, *Phayloopsis glutinosa*, and *Barleria*

noctiflora, the whole surface becomes covered with separate tubes, very similar in form, but destitute of spiral fibre, and terminating in a minute pore, from which streams of mucilage are discharged.

Those of several species of *Barleria*, *Lepidagathis*, &c. are entirely covered with long tapering simple hairs, which expand in water, and like the rest are enveloped in a thick coat of mucilage.

In all the foregoing species the hairs occupy the entire surface of the seed, and are usually directed towards its apex, though they occur often most abundantly at the edges; in others they are only found attached to a marginal ring of a different texture from the rest of the seed. This is the case in *Strobilanthus lupulina*, *Blechum Brownii*, and *Ruellia secunda*. The seeds of many plants of this family are wholly destitute both of spiral cells or of any other appendages possessing hygroscopic properties, such for example as *Acanthus mollis* and *ilicifolius*, *Dipteracanthus erectus*, and several species of *Justicia* and *Eranthemum*.—*Proc. Linn. Soc.*, March 17th, 1840.

Harrison on Longitudinal Striæ on Navicula Hippocampus.—It is not generally known, and indeed it has been denied by some, that there exist longitudinal striæ in *Navicula Hippocampus*. In specimens of recent Infusoria collected by me at Hull, several of this species are met with, and the striæ can be distinctly seen with a power of about 400 linear, especially if not mounted in Canada Balsam.—*Robert Harrison, Hull, 6th of June, 1841.*

[We have examined the specimens sent by Mr. Harrison, and can with him affirm that *Navicula Hippocampus* is beautifully striated from end to end, at the same time among some of the specimens forwarded in his first letter, we must confess such markings are not invariably met with, and the lorica has every appearance of not being so marked. Perhaps this might be a sufficient character to form a species or at least a variety upon.—*Editor.*]

E. J. Quekett's observations on a certain Crystalline Matter found on the recently cut surfaces of the Wood of the Red Cedar.—On the recently cut surfaces of the Wood of the Red Cedar (*Juniperus virginiana*) a crystalline matter is observed to form, which puts on the appearance of a mouldiness, but which, when viewed with a magnifying glass, is seen to consist of innumerable extremely minute crystals of an acicular form. The substance was observed to form on the duramen or heart-wood only, and not universally but in patches. It is easily volatilized by heat, and gives out the well-known odour of the wood. Mr. Quekett showed that the duramen of the red cedar contains an abundance of a concrete volatile oil, on which the peculiar odour depends, and that the crystalline substance is a compound formed between the air and the oil, for when the latter was obtained from the wood, and exposed to the action of the air, it was soon also found to be covered with the same acicular crystals. This substance, which possesses many of the properties of benzoic acid, Mr. Quekett considers new, and he proposed for it the name of *Cedarine*.—*Proc. Linn. Soc.*, March 3rd, 1840.

XXVI. — LETTER FROM M. RUSCONI TO PROFESSOR BRESCHET, ON A
NEW METHOD OF INJECTING THE LYMPHATIC SYSTEM OF REPTILES.*

PROFESSOR COSTA handed to me a short time since the letter with which you have been kind enough to honour me. I am delighted to see you have undertaken, at my particular request, to make some researches on the lymphatic vessels of reptiles; this subject well deserves your attention, and I feel satisfied your investigations will tend to the advancement of science. You desire to know the anatomical process of which I make use, for injecting the lymphatic vessels of reptiles; I hasten to satisfy you:—

In my first letter, after having briefly shown the chief results obtained by my experiments, and having also shown the singular disposition of the arteries enclosed within the veins, I believe I stated that I employ a small syringe in place of the injecting tube of Walter, modified by Sœmmering, and a fluid coloured red or white in the place of mercury—but I have not at all directed attention to the small instrument I use, and which is most essential, it is a kind of trochar, of which the canula is formed from the quill of the wing feather of the quail or partridge, the trochar being a tolerably large sized needle of five or six centimetres in length, and of which the point has three facets. It is on this small instrument that the successful result of the operation most frequently depends: I also take great precaution to sharpen its point well upon a hone, and also that the anterior extremity of the tube is adapted exactly to the needle.

When I am desirous of filling with injection the lymphatic system of a lizard, salamander, or tortoise, I seize with a small pair of forceps the mesentery close to the vertebral column where the reservoir of the chyle is situated, and I introduce into it the point of the trochar, I then retain the quill and withdraw the needle from the tube—after having thus withdrawn it, and I think it necessary, the tube is pushed forward, taking great care that the reservoir of the chyle has not been injured in any other part.

This done I seize with the small forceps the quill, and introduce into it the small extremity of the syringe, and push the piston with a force always decreasing. It is by this process the arterial and venous systems

* From the *Annales des Sciences Naturelles*.—February, 1842, p. iii.

are injected. When it is required to make a warm injection, the animal is placed in tepid water, and the injection is melted in a sand-bath. I do not dilate further on this subject, as I hasten to inform you that since my last letter, I have made some researches on other reptiles, and have found that land-tortoises, lizards, and snakes, are organized so far as regards the lymphatics, similarly to frogs and salamanders. In the snake I have seen a vein enclosed in a lymphatic vessel, but on this point I am not quite certain, not having at my disposal but two or three of those reptiles which were extremely small.

During the period of these researches it occurred to me to destroy the tortoises under observation by prussic acid. I was surprised to find them almost resist the poisonous action of this acid; I say almost, because the doses which caused the immediate death of a cock, cat, or a dog, do not sensibly affect them; so that to kill a tortoise of twelve centimetres in length, I have been obliged to inject into the stomach by the aid of a syringe, a dose of this poison which would have been more than sufficient to kill a horse, and after all it did not die until fifteen hours. But to return to the lymphatic vessels:—

When I announced to you the result of my observations on frogs and salamanders I was entirely ignorant that M. Weber, Professor of Anatomy at Leipsic, had inserted in Müller's Archives, 1835, an article on the hearts and lymphatic vessels of *Python tigris*. This observer has remarked that the lymphatics of this serpent are very large, and that the greater part of the arteries and even of the veins are enclosed in those vessels, but always separated from one another. He has observed that the aorta and its ramifications, even to the smallest, are enveloped in such a manner as to be bathed by the lymph: you see then that it is to M. Weber that the merit of the discovery of this fact is due, which entirely escaped the researches of Panizza.

One reflection occurs to me, and I cannot refrain from communicating it to you: M. E. Weber has made the dissection of but one reptile, the *Python tigris*, (which is seven feet long,) and he has enriched science with a very singular fact. Five years after I dissected a very small reptile in comparison, and I discovered the same fact. Panizza has dissected several land tortoises, but they were not sufficiently large for the experiments he had in view; he then procured several turtles. He has besides dissected many snakes, lizards, frogs, and salamanders, and in spite of all these opportunities, the fact of which I have spoken, altogether escaped his investigation. You will not be surprised at this when you recollect, that in all his experiments he employed the injecting tube of Walter and mercury. If he had made use of a syringe, and a

fluid coloured red or white, without doubt the fact of which we speak would not have escaped the notice of this anatomist.

In my researches on the common salamander, I will prove to you in the most manifest and positive manner, that Panizza is mistaken with regard to the lymphatic vessels of this reptile, and that he has fallen into error respecting the inferior or abdominal vena cava, of which he has misunderstood the direction and ramifications. I will further prove in the most incontestible manner, with the aid of drawings, made from nature, and placed side by side with his, that all the plates annexed to his work though drawn and engraved by a most talented artist, represent the lymphatic vessels entirely deformed, and that their deformity arises from Panizza having made use of mercury in his injections for demonstrating the lymphatic vessels.

Pavia, Nov. 16th, 1841.

Note on the above by M. G. Breschet.

WITH this letter M. Rusconi forwarded two sketches, the description of which will be hereafter given, and several small dried anatomical preparations, made from reptiles of which he had injected the arteries and lymphatic vessels. These two orders of vessels can be distinctly observed; but the state of desiccation in which they were did not allow of their examination with sufficient surety and precision, to determine with exactness the relations of these vessels with each other. This examination can only be made in a rigorous manner upon fresh portions injected in the best possible manner, or on portions preserved in a liquid and equally well injected.

We have, with M. Rusconi, altogether abandoned the injection of lymphatics with tubes and mercury, on account of this metal rupturing frequently by its weight, the vessels and lymphatic reservoirs, the walls of which are very thin. This method is above all insufficient and even bad, when investigations are entered upon and the course and ramifications of the vessels not hitherto known. If one of the small canals be opened, the metal runs out, and it is not further possible to continue the researches.

I believe, with M. Rusconi, that the expansions (bosselures) or nodosities which the lymphatics possess at various parts, are principally due to the presence and to the weight of the mercury. In my injections with other substances besides the fluid mercury, the vessels are more regular in their outline and much resemble those of arteries; whilst, it

must be admitted, they are not altogether exempt at certain points from these dilatations rendering their surfaces unequal and undulating. In this relation, they may be compared to veins, which they resemble in many other points and of which they are perhaps but a modification. As it is, I have frequently recognized something analogous on veins, both on the trunks, and on the divisions of small calibre. My experience on this particular, has probably some value, for professional anatomists are not altogether unaware that I performed numerous experiments on veins, and that I commenced publishing the history of this important section of the vascular system, which I am in hopes of continuing at some future period.

M. Rusconi generously gives us his operative process for making injections of lymphatic vessels; at the same time he forgets to make us acquainted with the nature and composition of the matter he employs to distend the vessels. We will now give in a few words, with a view of supplying this deficiency, that which the talented zootomist has omitted to mention.

Independently of the substances mentioned in the Dissertation of M. Dumeril, or in the Manual of Anatomy by E. A. Lauth, we have frequently employed with success, milk, isinglass variously coloured either with vermillion, cochineal, chrome yellow, prussian blue, indigo, &c., or the alcoholic solution of gum-lac, coloured with the substances just alluded to. Spirit varnish, or spirit of turpentine, and sometimes diachylon plaster, made liquid by heat in a sand-bath, are all of them methods of which the anatomist may take advantage.

It has been for a long time observed that injections in which the colouring substance is in suspension, are, in many cases insufficient, because in the very small vessels, there is a separation between the vehicle and colouring principle. I desired then to possess a colouring substance soluble in water, oil, or alcohol; in short a soluble matter. I have discovered this colouring matter, it is that which chemistry affords abundantly to commerce, at a low price, and is extracted from campeachy, fernambouc, or sandal woods.

The colouring matter of campeachy wood easily dissolves in water and in alcohol; it is so penetrating that it becomes rapidly spread throughout the vascular networks. The sole inconvenience of this kind of injection is, that it cannot be made to distend any except the most delicate vessels, and that its ready penetration does not admit of distinguishing between arteries, veins, and lymphatics.

Lastly, there is another process of injection which we frequently employ, and which may be termed the chemical process. The process

most made use of in the Anatomical Laboratories of Paris, belongs to Dr. Doyere, who promises to be to zootomy one of its most distinguished observers. According to this process,* an aqueous solution of bi-chromate of potass is propelled into the vessels; after a short time, in the same manner and into the same vessel, an aqueous solution of acetate of lead is injected. This injection is made quite cold in a most easy and economical way, and the finest vascular networks are instantly coloured of a beautiful sulphur-yellow hue. I have also made several trials with a solution of caoutchouc, which gives great flexibility to the vessels.

Explanation of the Figures, Plate V, Div. 1.

Fig. *a*.—Represents the small Syringe used by M. Rusconi for his injections.

This instrument *should be made of silver*; it is ten centimetres long by two in diameter; its free extremity, which is received in the small tube, is conical, thirty-two millimetres long, and should be *made of gold*. This syringe, has a ring on which the index or middle fingers rest, when the piston is about to be pushed forward. The end of the syringe, which is of gold, has very thin and at the same time resisting walls; the opening at the extremity should be as large as possible.

We cannot give here figures of the quills of the quail or partridge made use of by M. Rusconi. When it is required to inject the sanguiferous system of tadpoles or salamanders, the smallest tubes are used.

Fig. *b*.—Represents the lymphatic vessels of a portion of the rectum of a salamander, a continuation of the small intestines.—This drawing is a most faithful copy, drawn by M. Rusconi from an anatomical preparation, in which the lymphatics had been filled with a reddish coloured fluid, and the arteries distended by a substance of a white colour. On attentive examination of this figure, may be distinguished, by their white tint, the arteries in the centre of the lymphatics, and the branches (*ramuscles*) of these same lymphatic vessels.

XXVII.—ON THE MANUFACTURE OF GLASS FOR OPTICAL INSTRUMENTS.

MR. A. BOURNE of Chillicothe, Ohio, has addressed a letter to the Editors of the American Journal of Science and Arts, which is inserted at p. 207 of the number for January, 1841, in which after alluding to the decline of this art in proportion to the progress of the other arts in England, and to the results obtained by the Committee of the Royal Society of London in 1824, and the members of the Board of Longi-

* For a more detailed account of this process, consult the Microscopic Journal, Vol. I, p. 156.

tude for the improvement of glass for optical purposes, and which committee appointed a sub-committee, consisting of Sir John Herschel, Mr. Dollond, and Dr. Faraday, who in the year 1834 reported progress, that they had succeeded in making glass plates seven inches square, and eight tenths of an inch thick, tolerably free from bubbles and striæ, offers the subjoined questions for the consideration of men of science. Their glass (we repeat particulars for the sake of reference,) was a *silicated borate of lead*, composed of $104\frac{1}{4}$ parts of nitrate of lead, 24 parts of silicated lead, and 42 parts of borax; specific gravity 5.44, refractive index 1.8735, dispersive index 0.0703; and was not free from colour. This result, adds Mr. Bourne, does not appear to have been very satisfactory, and I have not heard of any further experiments or results.

Mr. B. then submits to the attention of men of science the following inquiries; the replies to which we shall be happy to insert in a future number should any of our correspondents think them worthy of their consideration:—

1. If we add a small quantity of lead to the materials of crown glass, so as to answer the purpose of a common crown glass lens of an object glass, and also add a larger portion of lead to the same materials, so as to answer the purpose of the common *flint* glass lens, will not these two kinds of glass have the same *character*, and produce spectra in which the several colours will be proportional, each to each?

2. If we add a very small quantity of lead to the other materials of flint glass, so as to answer the purpose of the *crown* glass lens, and also add a larger portion of lead to the same materials, so as to answer the purpose of the common flint glass lens, will not these two kinds of flint glass have the same *character*, and produce spectra in which the several colours will be proportional, each to each?

3. Can we use bismuth, or some metal other than lead, in the manufacture of transparent and colourless glass?*

4. As the inflexion of light by angular projections produces nearly the same dispersion that refraction does, and as the best of our polishing probably leaves the surface of glass rough and uneven, which would be obvious if we could see the ultimate atoms, may not a considerable

* We should presume that oxide of bismuth would give a yellow colour to glass, and it is quite doubtful whether we could impart any portion of the fluidity which belongs to the alloys of metallic bismuth to the compounds of its oxide with alkaline and earthy bases.—*Editors of Amer. Journ. Sc. & Arts.*

part of the dispersion be derived from the inflexion by the irregularly situated particles at the surface?

5. As the combination of bismuth with some other metals adds much to their fluidity in the melted state, would not the oxide of bismuth probably add much to the fluidity of glass in the melted state?

6. If we can render glass very fluid in the melted state, and cast lenses in finely polished moulds, is it not highly probable that the separate particles will arrange themselves by mutual attraction, much more regularly than the grinding and polishing can leave them? And may we not in this way hope to lessen the dispersion, or at least its irregularity?

Further, it is said that the alkalies render glass liable to a slow decomposition. If we could make transparent glass of alumina and bismuth, I have reason to believe that we should obtain great refractive power, very little dispersion, and great fluidity in the melted state, which are important desiderata; but it is highly probable that any combination with alumina would produce an opaque enamel. He concludes by saying that he has not heard of any experiments made for these specific purposes.

XXVIII.—ON THE STRUCTURE OF THE TISSUES OF CYCADEÆ.*

By the late David Don, Esq., Professor of Botany, King's College, London.

IN *Coniferæ* the structure of the stem presents the ordinary appearance of dicotyledonous trees; the annual layers are distinctly marked, and there is a regular bipartition of each into wood and bark (liber); but in *Cycadeæ* no bipartition takes place of fibro-vascular bundles, which in that respect resemble those of monocotyledonous plants, and the differences otherwise are very striking, *Cycas* having, besides a large central pith, several thick concentric alternating layers of cellular and fibro-vascular tissue; and in *Zamia* and *Encephalartos*, besides the pith, there are only two very thick layers, one of fibro-vascular, and the other, which is also the exterior one, of cellular tissue. The great peculiarity of the *Coniferæ*, and which distinguishes them as well from *Cycadeæ* as from every other family, is the remarkable uniformity of their woody

* From the Proceedings of the Linnean Society, 1840.

tissue, which consists of slender tubes, furnished on the sides parallel to the medulary rays with one or more rows of circular or angular dots ; but in *Cycadeæ* no such uniformity is observable, their tissue, as in other phænogamous plants, consisting of two kinds of vessels, namely of slender transparent tubes, without dots or markings, and of dotted, reticulated, and spiral vessels, which are capable of being unrolled. The former are identical with the fibrous or woody tissue, whilst the latter, which form a part of each bundle, can only be compared to the strictly vascular tissue of other plants. These dotted vessels in *Cycadeæ* bear a considerable resemblance to the vessels of *Coniferæ*, and especially to those of *Dammara* and *Araucaria*, from the dots being disposed in rows, and confined to the two vertical sides of the vessel only, and they are moreover alternate, as in the two genera just mentioned. In *Cycadeæ*, however, the dots present much less regularity in number and size than in *Coniferæ*, not only in different vessels of the same bundle, but in different parts of the same vessel, forming one, two, three, four, and five rows ; and they are not always confined to the vertical sides, but appear in some cases to follow the entire circle of the vessels. Their form is oblong or elliptical, in *Cycas revoluta*, *circinalis*, *glauca*, and *speciosa*, *Zamia furfuracea* and *pumila*, as well as in *Encephalartos horridus* and *spiralis* ; but they are sometimes longer, narrower, and nearly linear, giving the vessel the appearance of being marked with transverse stripes. The vessels in all present so much similarity, that no generic distinction can be drawn from them. The dots are always arranged diagonally. The dotted vessels of *Zamia furfuracea* and *pumila* were observed to unroll spirally in the form of a band, presenting a striking resemblance to those of Ferns. The band was found to vary in breadth in different vessels, and was furnished with transverse rows, composed of two, three, or more dots. The coils followed the direction of the dots, and the unrolling was from right to left. In *Cycas revoluta* dotted vessels frequently occur with a single row of dots ; but, from the circumstance of the dots on both sides being in view at the same time, they are liable to be mistaken as having a double row on each side. Besides the dotted vessels, there occurs throughout *Cycadeæ* another variety, differing but little from the ordinary spiral vessel, except in the tendency of the coils to unite. In some vessels the coils are free, and the fibre exhibits frequently, at intervals, bifurcations or narrow loops ; in others, the coils unite at one or both sides, in which case the vessel presents a series either of rings or bars ; and the fibre then is with difficulty unrolled, and it often breaks off into rings, or the bars separate at the point where the coils unite,

which is generally on the perpendicular sides of the vessel. In other cases the vessels are distinctly reticulated, and they then exhibit a striking analogy to the dotted cellules in *Cycas revoluta*. All these modifications are frequently to be observed in the same vessel in *Zamia furfuracea* and *pumila*, a fact which affords conclusive evidence of the accuracy of the theory advanced by Meyen, which refers the spiral, annular, reticulated, and dotted vessels to a common type. The dots and stripes are evidently the thinnest portions of the tube, being most probably parts of the primitive membrane remaining uncovered by the matter subsequently deposited on the walls.

The cellular tissue of *Cycadeæ* consists of tolerably regular parenchyma, composed of prismatic, six-sided cellules. In the species of *Zamia* and *Encephalartos*, so often referred to, the walls of the cellules appear to be of a uniform thickness and transparency, and destitute both of dots or marking; but in the adult fronds of *Cycas revoluta*, a different structure presents itself, for the walls of the cellules are furnished with numerous elliptical, obliquely transverse dots or spaces, where the membrane is so exceedingly delicate and transparent as to give the cellules the appearance of being perforated by holes, the intervening spaces being covered by incrustating matter, disposed in the form of confluent bands, which, when viewed under the microscope, resemble a kind of net-work. The dots or spaces uncovered by incrusting matter, are generally of a large size, and occur more particularly on the vertical sides of the cellules, a band usually running along the middle of the two opposite sides. The bands vary in breadth, as do the dots, and they not unfrequently exhibit minute transparent points or spaces, where the solid matter forming the band shows a tendency to separate. The extreme delicacy and transparency of the dots or spaces of whatever size, appear fully to prove that they are parts of the primitive membrane of the cellule, which are uncovered by the incrusting matter. A solution of iodine will be found of great service in determining the actual existence of the membrane at those parts; for although it does not materially alter its colour, it tends very much to diminish its transparency and renders it distinctly visible, so as to leave no doubt that the spaces are not openings. The bands are evidently the result of a partial lignification; and indeed no better example can be offered than *Cycas revoluta* to illustrate and confirm the correctness of the views advanced by Schleiden as to the origin of the bands and fibres in the cellules and vessels of plants. Being anxious to ascertain whether the bands exist at an early period, the author had recourse to the examination of a young undeveloped frond, about two weeks old, and he was

much gratified by finding his previous suspicions fully confirmed: the cellules then being of a uniform transparency, presenting neither bands nor dots, but furnished with a distinct cytoblast or nucleus, which was found to have entirely disappeared from those cellules in which the incrusting matter was visible, proving that the incrusting matter is formed at the expense of the nucleus. The matter forming the bands is continuous, and is evidently not formed by a coalescing of spiral fibres, as some might suppose; for it is perfectly solid, and shows no disposition to unroll or to break up into fibres. The bands most probably originated from the shrinking up of the incrusting substance, which at first was equally diffused in a fluid state over the walls, and which, from the mere effects of consolidation, aided by the distension, and perhaps enlargement of the cellule, would naturally leave portions of the primitive membrane uncovered. That the dotted and reticulated vessels in *Cycadeæ* are of the same nature, and originate in a similar way as the cellules just described, there seems no reasonable ground to doubt. The parenchymatous cellules in *Cycas circinalis*, *glauca*, and *speciosa* resemble those of *Zamia* and *Encephalartos*, in having their walls of a nearly uniform thickness and transparency, being but rarely furnished with a few elliptical obliquely transverse spaces or dots. The cellules in *Cycas revoluta* vary both in size and structure, some being three or four times longer, whilst others are still longer and narrower, and furnished with more numerous and much smaller dots, which are not confined to the sides, but are disposed around the tube. These last, which have been observed also in *Cycas glauca* and *circinalis*, present an evident transition to the dotted vessels.

The whole of the *Cycadeæ* are supplied with numerous gummiferous canals, often of great length, and uniformly furnished with distinct cellular walls of considerable thickness, and which have been accurately described and figured by Professor Morren in a recent memoir.

Notwithstanding the analogies presented by their reproductive organs, the author considers the *Cycadeæ* as related to *Coniferae* only in a remote degree, and that they constitute the remains of a class of plants which belonged to a former vegetation.

XXIX.—REMARKS ON THE GLOBULES OF BLOOD.*

By Dr. Henry Lambotte of Brussels.

NOTWITHSTANDING the numerous published accounts of the blood-globules, by the greater number of physiologists who have followed Malpighi and Leuwenhoeck, it must be admitted that they far from agreed, even at the present day, as regards their history. There are two points above all which are interesting in a scientific point of view, and on which there are conflicting opinions: thus, some physiologists believe, that each blood-globule is formed of a small nucleus surrounded by a kind of envelope; others, on the contrary, regard these small bodies as altogether homogenous, where they are naturally situated, but susceptible of presenting a nucleus, when submitted to changes due to external causes.

The existence of this central nucleus, to which many physiologists assign a most important part, is then not only very uncertain, although it be admitted by great authorities, but others not less imposing, consider it a matter of doubt, or reject it altogether.

A second fact, equally controvertible, is that of the solubility of the globules in water.

I have made several observations, with a view to arrive at an opinion on this subject. I made use of a simple microscope, furnished with lenses of different powers, the greatest of which magnified from six to eight thousand diameters; that of from five to six hundred diameters was employed, and was quite sufficient to verify the principal facts. The reflecting mirror was plane.

If the light be bright, as when it impinges from a large extent of sky, the globules may be seen representing a mass of small grumous vesicles, very regular and clearly defined; they have a gelatinous aspect, are quite transparent, and have a slight yellow tint.

If the light be less intense, or if it falls on the reflector at a more limited degree, as, for example, through a window, then the globules are marked either with a deep point occupying the centre, or with a blackish ring, which is nearly concentrical to the border; but all the globules met with in the field of the microscope, do not present the

* From the Bulletin de l'Academie Royale des Sciences et Belles Lettres de Bruxelles. Anné 1839. Tom. XVI. Part II. p. 130.

same aspect : thus, those grouped together at the side have generally a well defined circular line ; those entirely isolated, do not often show where they are imperfect ; on the margin of the field there are globules which exhibit this dark line well marked, and others where it is imperfectly visible. With very high powers, I have only observed rings, and never dark central points within the globules.

Every thing remains in the same state if the reflector be not moved, and if the slide be not removed further from the eye-piece ; but when the reflector is turned gently either one way or the other, at the moment all the points or shaded rings may be observed to move and to change their appearance ; for if the hand, or any other opaque body be passed between the window from whence the light enters, and the mirror which reflects the light upon the slide, the image of the hand or other body becomes evident in the globule ; even if a small dark line or point be made on the mirror, the same may be observed, if viewed attentively, in each globule ; but more, when the globules are attentively examined, it will be seen that in cautiously advancing and withdrawing the object towards the body of the instrument, there are nearly always some transparent globules of a more liquid character, in which may be traced the image of the bars of the window more or less distinct.

To form a correct idea of this phenomenon, and to be able to appreciate its character, it may be well seen in very small globules of grease ; but care must be taken in placing these small corpuscles slightly out of focus, on account of the degree of refractive power of grease : here, in the globules of grease, the annular series becomes confounded with the the margin of the globules ; but it must be remembered, that they are of a spherical form, and that the globules of blood are lenticular, which gives rise to that partially destroyed (caustique) appearance near the border of the latter. The same phenomena may also be seen in small globules of glass and bubbles of air ; but modified by the different refractive power of these substances.

Lastly, it is easy to be convinced that the shady ring seen in the blood-globules under the microscope, is nearly always owing to an optical illusion, produced by surrounding objects : I say nearly always, because I do not pretend to assert that other causes might not give rise to the same illusion ; as, for example, the depression which may be formed by the diminution (retrait) of a globule losing its volume, when the water with which it is impregnated evaporates. I do not further doubt, that it is impossible to produce a true central nucleus, when, for example, the surface of a globule absorbs the water in which it is placed to examine it, and presents in consequence, a different degree of refrac-

tive power in the central part to that which it does in the circumference or periphery.

As regards the question of the solubility or insolubility of the globules in water, it is surprising that it has for so long a time remained in dispute, and that so many difficulties have been brought forward to reconcile a fact, to all appearance so simple to verify. This diversity of opinion may probably be attributed to the means that have been employed in the endeavour to elucidate it. Thus, if blood be mixed with a small quantity of water, the water may dissolve a small part of the globular substance, and will be soon saturated; there will remain globules, which, although diminished in bulk, may have preserved a volume as large as before, by the absorption of water. If, on the contrary, too great a quantity of water be employed, the globules may disappear, either as the result of their limpidity, which is further increased in water, or because they are in reality dissolved.

But no doubt can remain, if the blood be operated upon in the following manner, in the way in which I did it: Spread on a piece of glass some drops of blood at the moment they are taken from the body, breathe immediately upon the glass; in a few moments the vapour of the breath condenses upon it, and the globules are dissolved in the liquid; there soon only remains on the glass a small quantity of reddish yellow fluid; this, when examined by the strongest power, does not exhibit the smallest globule, and has all the appearance of serum. This fact is very easily verified; but as it may be objected, that it is owing to the salts contained in the expired air, that the globular matter becomes dissolved, I convinced myself to the contrary by employing steam obtained from water heated from 35° to 40° : the result was the same; care must however be taken, that the temperature of the steam is not too high, as it would coagulate the globules, and render them insoluble.

I cannot pass over in silence a remark which necessarily arises from that which precedes; at the sitting of the 12th November, 1838, M. Askerson presented a memoir to the Academy of Sciences of Paris. (*Conjectures on the part performed by fatty bodies in the formation of layers of cellular tissue.*) Among the results arrived at by the author, was the following: *The globules or vesicles of blood are cellules which contain a fatty liquid; and it is their function to carry and to distribute this fluid everywhere, where the formation of cellules should take place.*

This fact would be very important, if it were true; but is it possible to believe, that if the blood-globules were fatty, that they would dissolve in water with such facility? On the other hand, is it so easy to con-

found fatty globules with blood-globules, when they are mixed, as is frequently seen in the body? It is thus that in a woman, who died of erysipelas of the face, I found that the blood contained in the veins of this part, offered a great number of small fatty globules, which were readily recognisable by the property they possessed of refracting light, and by their greasing the surface of the slide on which they were placed; they did not dissolve when the breath was directed upon them, whilst the globules of blood rapidly disappeared when so treated.

From the facts I have related, I consider I am authorised in stating, that *the globules of the blood have no central nucleus, but are composed of corpuscles or small homogeneous masses completely soluble in water.*

[We have repeated the experiment above alluded to, but do not rest altogether satisfied with the results obtained by Dr. Lambotte. We do not question the enlargement and rupture of the blood-corpuscles by endosmosis, which evidently takes place when blood is so treated. As Dr. L. used a single lens of such high power, probably the transparent envelopes of the corpuscles could not be seen to such advantage as when they are viewed with a compound microscope, and with powers of acknowledged achromatic superiority. Our apology for inserting the above communication entire, must be the desire we entertain of recording the labours of Continental observers.]

XXX.—ON THE DEVELOPEMENT OF THE ANIMAL TISSUES.

By Professor Müller.

[Continued from page 83.]

CLASS III.—1. *Cartilages*.—Their structure and mode of development has already been described, (see page 80).

2. *The Teeth*.—The enamel of a tooth not yet fully formed retains the same form and structure after it has been treated with dilute acid. The inner surface of the enamel membrane which envelopes the crown of the tooth is formed of short hexagonal fibres, placed perpendicularly, so that each fibre of the enamel membrane corresponds to a fibre of the enamel. These fibres of the enamel membrane appear to be elongated cells. In the fresh state they contain a nucleus with nucleoli. Beneath these prismatic fibres of the enamel membrane is a layer of round cells which probably represent the primary condition of those fibres. The

true enamel fibres probably separate from the enamel membrane, coalesce with the enamel already formed, and at the same time become impregnated with calcareous salts. The substantia propria or ivory of the tooth is formed of fibres, between which the dental tubuli run. The pulp of the tooth at its surface consists of cylindrical cells which contain nuclei with nucleoli. The interior of the pulp is composed of round nucleated cells. Schwann conjectures that the fibres at the surface of the pulp are in successive layers added to and converted into the growing dental substance.

CLASS IV. 1. *Cellular Tissue*.—In the development of cellular tissue there first appears a structureless cytoblastema, in which round nucleated cells are subsequently formed. These cells become transformed into spindle-shaped bodies, which have in their interior, but attached to their wall, a round or oval nucleus, while this nucleus in its turn includes one or two dark points (nucleoli). These elongated cells become more and more drawn out at their extremities, and give off fibres, which are sometimes branched; and at length become resolved at each end into a fasciculus of extremely delicate fibrils. The division of the fibre-like prolongations of the cells into more minute fibrils gradually extends towards the centre of the cell, so that at a later period the fasciculus of fibrils proceeds immediately from the body of the cell. Lastly, the division into fibrils takes place even in the situation of the nucleus of the cell, and then the cell becomes wholly resolved into a fasciculus of fibres, upon which the nucleus lies. The fibres are probably tubular.

The cells of adipose tissue which are found even in the cellular tissue of the fœtus, present at first a distinct nucleus attached to their membranous wall. When the wall of the cell is thin, the nucleus forms a prominence above the surface of the fat globule contained in the cell. When the wall of the cell is thick, the nucleus is entirely included in its thickness. The nucleus contains one or two nucleoli. The fat cells in the cranium of a young fish (Plötze,) sometimes have each two nuclei which bear the same relation to the membranous wall of the cell. In the cellular tissue of the fœtus a third kind of cells is met with. These are round and pale; each has a nucleus with one or two nucleoli attached to their wall; they do not become elongated into fibres, contain no fat, but are filled with granules; and this deposit of granules is first formed about the nucleus.

The cellular tissue of the fœtus, when submitted to boiling, yields no gelatine; but in its place a substance which resembles pyine, except

in the particular that the turbidity produced in the solution by hydrochloric acid is removed by the addition of an excess of the acid.

2. *Tendinous Tissue*.—The fibres of tendinous tissue are formed from cells, in the same way as those of cellular tissue.

3. *Elastic Tissue*.—The middle coat of the arteries in embryo pigs, six inches in length, contains numerous isolated cells, some of which are globular, and some have an oblong form, while others give out two or more branching processes of various length. At the inner surface of the wall of each of these cells lies the usual nucleus with one or two nucleoli. In addition to the cells thus variously modified, fully developed elastic tissue is also present. The branching fibres of elastic tissue, which according to Purkinje, are hollow tubes, appear to be formed from the cells just described.

CLASS V.—In the development of the tissues of this class there are first formed independent cells, which either are round or cylindrical, or have a stellate form. In the former case the primary cells arrange themselves in longitudinal series, their walls coalesce at the points of contact, and the septa thus formed between the cavities of the different cells are subsequently absorbed, so that in place of several primary cells one secondary cell is produced. This secondary cell now continues to grow as the simple cells grow. In this way the fibres of muscles and nerves appear to be developed. In the case of the stellate primary cells the radiating processes of contiguous cells unite, and their walls becoming absorbed at the points of union, a network of communicating canals is formed. This seems to be the process by which capillaries are developed.

1. *Muscles*.—Valentin had observed that the primitive fasciculi (fibres) of muscles are formed by granules arranging themselves in a linear manner and coalescing; but that the primitive fibres (fibrillæ) are produced by the subsequent division of the primitive bundle. Schwann has remarked that the primitive fasciculi in the muscles of a foetal pig, measuring three inches and a half in length, present a dark border—and a middle, more transparent part, probably a cavity. In this more transparent part he perceived, besides some small granules a series of larger oval flat bodies, which appeared to be the nuclei of cells, and frequently contained one or two smaller corpuscles—their nucleoli. These nuclei lay at pretty regular distances from each, in the thickness of the cylinder, but external to its axis. In muscles more advanced in development, the primitive fasciculi present no indication of a cavity; but the nuclei remain visible for a long period, frequently producing slight prominences on the surface of the cylinders. According to re-

cent observations of Rosenthal, the nuclei are still present in the muscular fibre of adult animals. The proper substance of the muscular fibres is produced by a deposit taking place within the tube. (The structureless sheath of the primitive muscular fasciculus, which I observed long since in insects, appears to be the remains of the tube formed by the united walls of the primitive cells.)

According to the late observations of Valentin,* there are first visible in the blastema of muscle nuclei with nucleoli, which soon become surrounded by extremely delicate cells. These cells assume an oblong figure and arrange themselves in linear forms like filaments of *Confervæ*. On the inner surface of the membranous walls of the tubes, or secondary cells formed by the coalescence of the primary cells, longitudinal striæ or fibres are deposited, while the septa dividing the tube into compartments are absorbed. The muscular fasciculus then has the form of a tube, with proportionally thick walls which are composed of perfectly transparent longitudinal fibrils. The nuclei of the primary cells are contained in the cavity of the tube.

[..... Mr. William Bowman's Observations "On the Minute Structure and Movements of Voluntary Muscles," read before the Royal Society, June 18th, 1840, not having been referred to by Professor Müller, we consider, now that we are detailing the labours of philosophers on this subject, we should be committing an act of injustice to this talented observer, did we not quote the abstract of his paper published in the Proceedings of the above named Society, and refer those of our readers still further interested in details, to the entire paper in the Philosophical Transactions for 1841, where the excellent illustrations bear out to the letter the facts brought forward : —

"The objects of the author, in this paper, are the following,—1st. To confirm, under some modifications, the view taken of the primitive fasciculi of voluntary muscles being composed of a solid bundle of fibrillæ. 2dly. To describe new parts entering into their composition. And 3dly. To detail new observations on the mechanism of voluntary motion.

"He first shows that the primitive fasciculi are not cylindrical, but polygonal threads ; their sides being more or less flattened where they are in contact with one another ; he next records, in a tabular form, the results of his examination of their size in the different divisions of the animal kingdom. It appears that the largest are met with in fish ; they

* Müller's Archiv., 1840, p. 179.

are smaller in reptiles, and their size continues to diminish in insects, in mammalia, and lastly, in birds, where they are the smallest of all. In all these instances, however, an extensive range of size is observable, not only in different species, but in the same animal, and even in the same muscle. He then shows that all the fibrillæ into which a primitive fasciculus may be split, are marked by alternate dark and light points, and that fibrillæ of this description exist throughout the whole thickness of the fasciculus; that the apposition of the segments of contiguous fibrillæ, so marked, must form transverse striæ, and that such transverse striæ do in fact exist throughout the whole interior of the fasciculus. He next inquires into the form of the segments composing the fibrillæ, and shows that their longitudinal adhesion constitutes *fibrillæ*, and their lateral adhesion *discs*, or plates, transverse to the length of the fasciculus; each disc being, therefore, composed of a single segment from every one of the fibrillæ. He shows that these discs always exist quite as unequivocally as the fibrillæ, and gives several examples and figures of a natural cleavage of the fasciculus into such discs. It follows that the transverse striæ are the edges, or focal sections of these discs. Several varieties in the striæ are then detailed, and the fact noticed that in all animals there is frequently more or less diversity in the number of striæ in a given space, not only on contiguous fasciculi, but also on the same fasciculus at different parts.

“The author then proceeds to describe a tubular membranaceous sheath, of the most exquisite delicacy and transparency, investing each fasciculus from end to end, and isolating it from all other parts; this sheath he terms *Sarcolemma*. Its existence and properties are shown by several modes of demonstration: and among others, by a specimen in which it is seen filled with parasitic worms (*Trichinæ*), which have removed all the fibrillæ. The adhesion of this sarcolemma to the outermost fibrillæ is explained.

“It is also shown that there exist in all voluntary muscles a number of minute *corpuscles* of definite form, which appear to be identical with, or at least analogous to the nuclei of the cells from which the development of the fasciculi has originally proceeded. These are shown to be analogous to similar bodies in the muscles of organic life, and in other organic structures.

“The author next describes his observations on the mode of union between tendon and muscle; that is, on the extremities of the primitive fasciculi. He shows that in fish and insects the tendinous fibrillæ become sometimes directly continuous with the extremities of the fasciculi, which are not taper, but have a perfect terminal disc. In other cases

the extremities are shown to be obliquely truncated, where the fasciculi are attached to surfaces not at right angles to their direction.

“Lastly. He states his opinion, and gives new facts on which it is founded, that in muscular contraction the discs of the fasciculi become approximated, flattened, and expanded; the fasciculi, of course, at the same time becoming shorter and thicker. He considers that in all contractions these phenomena occur; and he adduces arguments to show the improbability of the existence of any rugæ or zigzags as a condition of contracting fasciculi in the living body.—The paper is abundantly illustrated by drawings of microscopic appearances”]

2. *Nerves*.—Each entire nervous fibre is to be regarded as a secondary cell, formed by the coalescence of a series of primary nucleated cells. Schwann is of opinion that the white substance of the nervous fibre, which forms a tube around Remak’s band-like axis of the fibre, or the cylindrical axis of Purkinje, is a secondary deposit on the inner surface of the membranous wall of the secondary cell. He finds that the white substance of each nervous fibre is invested externally by a peculiar structureless sheath like that of the primitive muscular fasciculi. This membranous sheath can be distinguished as a transparent border external to the opaque white substance of the fibre. Its defined outline is opposed, Schwann remarks, to the view of its being composed of cellular tissue. In perfectly formed nervous fibres Schwann sometimes perceived here and there at the side of the fibre a nucleus which lay included in the transparent border formed by the membranous sheath. In the grey nervous fibres no white substance is formed.

[In the substance of the brain of young embryos, Valentin observed cells, on the outer surface of which a granular mass was gradually deposited. These cells subsequently became nuclei; and their former nuclei became nucleoli; while the granular matter deposited around them formed the mass of the ganglionic globules, which were thus developed. Valentin has also observed, that after the development of nervous fibres, nuclei, elongated fibre cells, and fully developed fibres of cellular tissue are formed around them.*]

Schwann’s discoveries are to be ranked amongst the most important steps by which the science of physiology has ever been advanced.

* Compare Valentin’s observations on the Development of Tissues in Wagner’s Physiology, p. 132. [Willis’s translation, p. 214.] Henle’s observations on the Structure of the Tissues in his *Symbolæ ad Anatomiam* cet. Berol, 1837. Müller’s Archiv., 1838, p. 102. Froriep’s Notiz. n. 294.

They afford the basis for a general theory of vegetation and organization which it had hitherto been impossible to frame. Valuable observations had been made in all parts of physiology, and some branches of the science had been brought to a state of high perfection. But as regards the fundamental principles on which all should rest, these it must be confessed were either very unstable or entirely wanting, hence the slight connection which seemed to subsist between different important observations in parts of the science which were far advanced. These fundamental principles are now obtained. Schwann himself has pointed out with equal lucidity and acuteness, the general conclusions which are to be deduced from the observations of Schleiden and himself, and has framed from them a theory of the organization and vegetation of organized beings. It is not possible to give here more than the principal features of his theory.

There is one common mode of development observed in the formation of the most different elementary tissues of plants and animals, and that is the development from cells. In a pre-existing structureless substance, which may be situated either within or on the exterior of cells already formed, new cells are developed in a manner regulated by determinate laws, and these new cells undergo various modifications and transformations by which they are converted into the elementary organic tissues. In every tissue the new cells are formed only in those parts to which new nutritive matter has direct access. On this alone depends the difference subsisting between the vascular and non-vascular tissues. In the former the nutritive fluid, the liquor sanguinis, is distributed through every part of the tissues, and hence new cells are formed through its substance. In the non-vascular tissues, on the contrary, the nutritive fluid has access to one surface only, as in the case of the epidermis. Hence in cartilages, also, when they are destitute of vessels the new cells are formed only at their surface, or to a slight depth, namely, as far as the liquor sanguinis, their cytoblastema penetrates. The expression, growth by apposition, is correct, when understood to signify the development of new cells, and not the growth of those already existing; for in the epidermis new cells are formed only at the inferior surface of the membrane, whilst in the vascular tissues the new cells are developed in the whole substance of the tissue. In both cases, however, the cells themselves grow by intus-susception. Cartilage is at first destitute of vessels, and the new cells consequently are formed only in the vicinity of the external surface. But after vessels have extended into the medullary canals, the formation of new cytoblastema and new cells can proceed not only on the surface of the

bone, but also around each of these canals. This explains the structure of the cartilage of bone, the lamellæ of which are concentric, partly around the whole bone, and partly around the medullary canals. The process by which the primary cells are formed is the following. The cytoblastema, which is at first structureless or only finely granular, presents after a time round corpuscles. These corpuscles are in their earliest recognizable condition, the nuclei of cells, around which cells are subsequently to be developed. The nucleus is granular, and may be either solid or hollow. The part of the nucleus first formed is the nucleolus. Around this there is deposited a layer of fine granules. The nucleus thus formed increases in size, and then the cell is developed around it by the deposition of a layer of substance different from that of the surrounding cytoblastema. This layer has at first no defined outline; but when it has become consolidated into a membrane, it expands by the continued addition of new molecules in the interstices of the old ones. It thus becomes removed from the surface of the nucleus, which remains attached to one point of the wall of the cell. This formation of the cell around the nucleus is only a repetition on a larger scale of the process by which the nucleus was formed around the nucleolus. The membranous wall of the cell differs in its chemical properties in different kinds of cells, and even in the same cell it varies in chemical composition at different periods of its growth. Thus the walls of vegetable cells, when first formed, are, according to Schleiden, soluble in water, which is not the case with the cells which are perfectly developed. The matter contained in the cell varies in a still greater degree; for example, it is in one case fat, in another pigment. In a cell which is at first perfectly transparent, a granular deposit may gradually appear, its formation commencing around the nucleus; or, on the other hand, a granular deposit contained in a cell may be gradually dissolved.

Extracts and Abstracts from Foreign Journals.

[From the *Comptes Rendus*, 1841.]

Flourens researches on the Development of Bones.—In this Memoir the author treats on the general mechanism connected with the formation of Bones, and deduces, from the experiments quoted in detail, these three general conclusions;—1. There is in bone, a formative apparatus, which is the periosteum :—2. There is also an absorbing apparatus, viz.

the medullary membrane :—3. The medullary membrane or internal periosteum, is but a continuation of the external periosteum.—*Oct. 4, 1841, p. 681.*

Biot “ On the influence of a Lamella-arrangement in the phenomena of Polarisation and Double Refraction, produced by different crystallised bodies.”—*31st of May, and 21st of June, 1841, p. 112.*

[We quote the title of this and the following paper by way of reference for those of our readers interested in the laws of Optics.]

Biot “ On the Optical Examination of a substance having the appearance of Natural Manna, and introduced as such in Commerce for Medicinal uses.”—*10th of Jan, 1842, p. 49.*

Laurent on the Return of the Monstrosities of the Hydra to a Normal State.—He has confirmed that the several monstrosities of the *Hydra* about to produce young, never give birth to other monsters, and that the offspring are normal individuals. He has equally determined the various physiological conditions by means of which they can prolong the monster state, or favour the natural tendency of several of these monsters to return towards their normal form.—*21st of June, 1841, p. 1171.*

Bouchardat on the Theory of Buds, and the Existence of Rhyzogènes.—In this memoir the author passed successively in review the various circumstances which may favour or retard the development of roots, when stems are immersed in water; he exhibited by experiment the influence of light, heat, that of certain acids mixed in different proportions with the liquid; he examined the conditions of evolution of the roots which depend on the state of the stem and those belonging naturally to the plant, and lastly observed the changes produced in the organs of a branch placed in those circumstances capable of giving rise to buds.

When a leaf-bearing stem deprived of its root is placed in a vessel filled with water, the green parts remain turgid frequently for a very long period, but without evincing any appreciable growth. The water first penetrates at the cut end, but this diffuse and irregular passage does not fail to be interrupted, at least in a great part, by the death of the extremity of the stem. There exists, however, organs which by an isolated kind of development can supply to the defect of absorption resulting from this alteration; these are the *lenticels*, organs irregularly dispersed on the bark, and having no communication with the interior of the stem. These lenticels, essentially composed of cellular tissue, enlarge on immersion in the fluid, project considerably, and finally become organs of absorption, denominated by M. Bouchardat *caulinear spongioles*; they are then seen under the form of white tubercular masses, sometimes elongating as true roots, but they may be always distinguished from such in this stage of growth, by never having any direct connection except with the external part of the bark.

When the caulinear spongioles are developed on a stem, its preservation in pure water may be relied on for an indefinite length of time ; but its growth is none or inappreciable, for these are not the normal organs of absorption. It is not the same even with the absorption which operates by means of the development of special organs, at first confounded with lenticels, but which, according to the observations of M. Bouchardat, are essentially distinct. Considering these latter organs as the true root-buds, he has given them the name of *Rhyzogènes*.

"At first," says he, "the *Rhyzogènes* and *Lenticels* might be confounded ; nevertheless a little attention will render evident the fact that whilst the latter are distributed without order on the bark, the others have a regular mode of distribution. Further, lenticels are flat, or very slightly swollen ; rhyzogènes, on the contrary form conical protuberances ; lastly, microscopical examination shows, that whilst the lenticels are as before stated essentially composed of cellular tissue, and solely in connection with the external part of the bark—rhyzogènes are formed of a number of vessels and cellular tissues and have an evident communication with the woody axis. The preservation of the green parts of a branch may be the result of a simple development of the caulinear spongioles, as above stated ; but it is only by the growth of rhyzogènes that a true increase of structure can take place."

The portions of the lower part of the stem at the point where the rhyzogènes are developed, have given rise to true roots, modified according to a particular manner, and the study of the changes presented, appears to M. Bouchardat, to be able to furnish a new argument in favour of the theory of M. Du Petit Thouars, on the mode of growth of plants.

For the Science of Botany properly speaking, the consideration of rhyzogènes, has also according to the author, a certain importance, and may be able to furnish good characters for distinguishing one from the other in nearly allied species.—21st of June, 1841, p. 1172.

[From *Valentin's Repertorium*, 1841.]

Valentin on Parasites in the Bladder of the Frog.—In spring and summer I found a great number of parasitical animals within the urinary bladder of the frog, which probably represented transitional conditions between the Infusorial-like creatures and *Distoma cygnoides* observed by MIESCHER in the same viscus. At their anterior extremity they possessed a large excavation, becoming narrower posteriorly, at the bottom of which was an opening, having two distinct marginal lines, and surrounded by radiating folds. Behind this, on the external surface of the body, was a wreath of cilia, which in the live animal was in active motion, but in the dying creature moved but slightly, and in a pulsating or rythmical manner. By means of these organs the parasite moved itself in a circle, without exerting any great locomotive action. Through the opening at the bottom of the discoid excavation, a smaller, though yet a comparatively large and round body might be observed, which, when

viewed laterally, appeared as if placed in the posterior portion of the body; and here also might be seen sometimes two or more vesicular bodies. In the dying or dead animal, a sinuous tube, having an enlarged extremity, was to be observed, which was probably an intestinal canal. In the interior of the body was an apparatus of cilia, though it was not always very distinctly seen. The internal large bladder was sometimes so much distended, that it covered a great portion of the other organs. Besides these, numerous small granules, varying from each other very much in size, were seen internally. Remarkably enough, the neighbouring intestine of the frog, did not contain any of these animals, but an immense number of Infusorial creatures, and a *Filaria*. A single specimen was found near the liver.

Negrier on the connection of Menstruation with the Graafian Vesicle.—Menstruation, according to the author, is connected with a periodical bursting of a Graafian vesicle in the ovarium. In the new-born female there are only to be found rudiments of follicles; about the 12th year, a grey matter is observed within the follicular coverings, which soon becomes hardened. At puberty the interior of the follicle becomes yellow, and the follicle itself is now more vascular. At the first menstrual period, a follicle swells, and bursts at its peritoneal surface. This is repeated at each menstruation, and ceases at the time when the uterine discharge stops.

Grübe on the Menstrual Blood.—Besides want of coagulating power, and the presence of much albumen, with diminished quantity of fibrine, the menstrual blood is characterised by the altered condition of the true blood-globules, which are often notched and crumbled.

Storer and Valentin on the Spawn of Syngnathus.—Storer has observed abundance of spawn in the male Syngnathus, which decidedly receives the eggs from the female. Valentin remarks since the confirmation of the opinion of Rathke, that the female bears the spawn, I have several times examined, under the microscope, the organs, or at any rate what was analogous to them, mentioned by Rathke, taken from specimens preserved in spirits, belonging to the species *S. pelagius*, *Ophidion*, and *Rondeletii*, and have seen the elements of the egg in the generative organs. On the other hand, in a fresh Syngnathus, provided with spawn, which was obtained at Nizza, the genitals appeared perfectly white, and only exhibited, under the microscope, granular bodies, so that even after a microscopical examination, I could not say to which gender the creature belonged.

Langenbeck on Medullary Sarcoma.—The femoral artery of a dog was opened, and some blood drawn off; this being freed from its fibrine, was mixed with the soft matter of a medullary sarcomatous tumour of the humerus, and injected into the artery; the diseased limb had been amputated two hours and a half previously, and was not quite cold. In nine weeks time there were found two or three light-blue circular and

flattened swellings upon the anterior surfaces of the upper portions of the right and left lungs, and which were like carcinoma of these organs in man. In the substance of the central portion of the left lung was a hard circumscribed tumour, about the size of a bean; the portions of the lung surrounding were normal in character. This tumour presented on a dissection the characters of a carcinomatous tubercle. Under the microscope the numerous red points in it were seen to be convoluted capillary vessels. The substance of the tumour itself consisted of strong fibres of the thickness of the primitive muscular fibres, having between them closely placed cells of $\frac{1}{100}$ th" in diameter. In the fluid got from the tumour by pressure, were found small cells about the size of the blood-globules, besides some still smaller cells of oil-globules. These identical microscopic elements were found in the medullary sarcoma of the humerus.

Erdl on the Kidnies of Helix Algira.—Between the delicate vessels of the vascular net-work met with in the urinary glands of *Helix Algira*, are spaces containing round or elongated cells, apparently seated on these minute vessels; these cells sometimes contain a nucleus, at other times are empty. This nucleus increases in size, finally becoming as large as the mother cell, and then becomes freed from the net-work of vessels, remaining free in the kidney; at length it passes off by the excretory duct of the organ.

Simon on the Structure of Warts.—The common warts met with on the integuments of the hand, consist of papillose elongations of the corium, which appear as delicate, closely-packed fibres, covered by the upper skin. Warts with peduncles contain soft cellular tissue, and often fat. Both kinds are to be met with in the domesticated mammalia.

Valentin on Hair.—Near the unhurt points of hair which has not been cut, as for example, in the hair of the mons veneris, the forms under which the transverse lines are seen, indicate that here delicate epidermoid scales are placed upon each other like tiles. By the use of sulphuric acid, however, which is a very good re-agent for this investigation, the matter becomes plainer. The very thin scaly pieces which appear to be placed in a double and opposed direction around the longitudinal axis of the hair, separate from each other, very often in a regular manner, so that the surface of the hair appears as if symmetrically tessalated by their fibres. Since these little scales near their free margins exhibit some portion of their surface, they appear like fibres, whose separated edge or place where the connection is broken evinces their true nature, viz.—elongated scales void of nucleus. By this structure hair approaches only the formation of horn, since in horn got from the ox, large scales will separate from it with the use of any re-agent. After making use of the sulphuric acid, the apparently fibrous horny substance is seen to consist of scales. These scales, as well as horn and epidermis, have no visible nuclei. I should be therefore inclined to reduce all the apparently fibrous substance to such scales. In dif-

ferent hair they are more coloured or devoid of colour, or have long pigment cells.

Della Chiaje on the appendages of the Kidnies in Fishes and Reptiles.—In *Ammocatis branchialis* and *Petromyzon fluviatilis*, they are placed on the outer margin of the gland, near the ureter and the fatty bodies. In *Petromyzon marinus* they cover the outer surface of the kidney, and in *Accipenser sturio* and *A. muræna* they appear as round yellow bodies incorporated with the parenchyma of the same. In *Torpedo electrica*, *T. galvanii*, *Squalus centrina*, and *C. acanthias*, they constitute a semi-lunar yellow granulated mass about the size of a large bean at the base of the left portion of the kidney. In *Raja rubus* and *R. batis*, they lie in the form of a Y along the middle line between the glands.

The greatest development occurs in *Squalus acanthias* and *S. mustelus*. In the *flat tailed Salamander*, along the edge of each kidney are seen a row of round yellowish bodies composed of glandular acini. *Rana esculenta* has in the middle of the under surface of the organ small yellow glands composed of minute ramified vessels, and which are also found in the *green* and the *common Toad*. These appendages of the kidnies receive their arteries from the Aorta and four large veins from the Vena cava.

Valentin's remarks on Trichina spiralis. (Vide page 147 of the Microscopic Journal.)—In specimens which have been preserved in spirit I have not only observed the granular matter in the two poles of the outer cyst, but also in the narrow space which appears to exist between the outer and inner cyst and connecting as it were the two poles on all sides. The outer cyst is probably a true organized envelope, whilst the granules are rich in inorganic salts. If the cysts are acted on by weak caustic bicarbonate of Potassa, the walls of the outer cyst appear as a narrow bright stripe, whilst the granules remain dark. After being acted on by Hydro-chloric acid, carbonic acid is evolved and all becomes brighter and more transparent. In the latter case the skin of the inner cyst sometimes exhibits concentric lines which, perhaps, indicate its origin from concentric layers. The intestine and longitudinal thread are distinctly visible in the preserved specimens. At the anterior obtuse rounded extremity I several times observed an oval cavity, which was probably the oral aperture alluded to by Owen and Wormald.

The granular organ described by Farre and Bischoff, and which appears to me a very doubtful ovary, I could not discern in the preserved specimens. Only once did I see it as a bright granular spot after the action of the Hydro-chloric acid.

[From *Schlechtendal's Linnæa*, 1842.]

Bange on the Seed of Pugionium cornutum.—That the outer covering of the seed cannot be an arillus is evident enough if this plant is regarded as a member of the Cruciferæ. It must, therefore, be one of

the proper coats of the seed, and regarded as an "integumentum exterius" since there exists beneath it an "integumentum simplex membranaceum." We do not find any where amongst the Cruciferæ a semblance to this, or at the most a delicate epidermis lying closely upon the testa, which sometimes spreads out at its margin in a winged manner. Besides, within this covering which loosely envelopes the seed we find the umbilical cord, and which cannot be in the least compared with a raphe. Further who ever observed in a ripe seed of the Cruciferæ an "Embryo gramineo-viridis." The thickening of the radicle near its extremity, is a condition which as far as I know is found in no Cruciferous plant.

Pugionium must be removed from the Cruciferæ, it belongs to the family Chenopodææ.

Bange on the Seed of Dipterygium glaucum.—This plant is not one of the Cruciferæ but belongs to the tribe Capparidææ. This view I adopt from the presence of an albumen enclosing the embryo as it does in Capparidææ, this was described by Decandolle as an "Endopleura tumida," whilst others have wrongly denied the presence of an albumen.

[From *Oken's Isis*, Heft 3, 1842.]

Meyer on the Anatomy of the Entozoa.—The indefatigable author has here given us very full and able dissections of the intestinal worms, the internal structure of which has hitherto not been sufficiently known.

Trichocephalus dispar from the Cæcum is first described, and drawn highly magnified both male and female on tables 1 and 2. The intestinal tube is fully represented with the oral and anal apertures, as also the seminal vessel with the *ruthe* near the anal opening. The female organs are also equally well shown. The oviduct is exceedingly long, commencing posteriorly near the anal orifice, then running as far as the stomach and turning back again to the anus it proceeds once more close to the stomach where it opens in the middle third of the body. The ova are drawn highly magnified.

Oxyuris ambigua both male and female, and the male of *O. acuminata* are represented on table 3. The opening of the seminal canal is near the anus, just before the point of the tail, that of the female is further forward. The male and female organs of *Distoma appendiculatum* are well developed in table 3, fig. 12, and the same may be said of *D. cylindricum*, table 3, fig. 13.

The dissections of *Octobothrium lanceolatum* call for especial praise, four pair of suckers are drawn posteriorly, two anteriorly near the mouth, behind these one with ten teeth where the male and female canals open; the stomach is double and blind, and runs backwards, the ovi-sac especially is very large, the seminal duct contains large seminal capsules, which are also drawn highly magnified.

No circulating apparatus is to be seen, and that which Nordmann took for the circulation in *Diptozoon* was but the movement of cilia.

[From the *Gazette des Hopitaux*, 1842.]

M. Borjery on the Microscopic Anatomy of the Spleen in Man and the Mammifera.—From the anatomical structure of the spleen, and the appearance of the fluid contained in its vesicles as shown by the microscope, the following propositions may be advanced respecting the functions of this organ: these propositions although not *positively* indicating the whole service of the spleen, point out the path to its determination.

1st. The spleen appears to be an organ of sanguineous elaboration and consists of two different structures.

a. A secretory vesicular apparatus operating directly on the arterial blood, the product which is absorbed by the veins being only a preparatory step towards another elaboration. This should have its seat in the liver, where the splenic fluid is carried along with the venous blood of the digestive organs.

b. A lymphatic apparatus on the one hand, acting on the blood furnished to it by the numerous little glandular arteries, and on the other on the fluid residues of the elaboration of the vesicular apparatus, conveyed to it by the lymphatics.

2dly. These two portions or structures do not appear to be connected anatomically, and juxtaposed organule to organule, save in the point of exercising a common function. The venous residues of the two portions go equally to the Liver, whilst the mere residue of the lymphatic glands is transported in the apparatus of the same name.

3rdly. The analogy of texture between the spleen and the lymphatic glands though not affording evident proof, admits of the legitimate assumption that these two organs can up to a certain point supply the place of each other, and which explains the want of fatality when the former is extirpated.

Ehrenberg on the Perception of the Smallest Bright Bodies.—On pressing small globules of quicksilver on a glass micrometer, he easily obtained smaller globules of $\frac{1}{100}$ th to $\frac{1}{2000}$ th of a line in diameter. In the sunshine he could only discern the reflection of light, and the existence of such globules as were $\frac{1}{300}$ th of a line in diameter with the naked eye; smaller ones did not affect his eye either in sunshine or with a Chevalier's reverberatory lamp. He however remarked, at the same time, that the actual bright part of the globule did not amount to more than $\frac{1}{900}$ th of a line in diameter. Spider-threads of $\frac{1}{2000}$ ''' in diameter were still discernible from their lustre.—*Poggendorff's Annalen*, in *Taylor's Scientific Memoirs*, Vol. I, p. 583.

Pappenheim on the Ligament of the Velum Palati.—It is easy to see with the naked eye that there is a white streak on the anterior median

line of the velum, which takes its origin from the lowest extremity of the uvula, dividing the velum into two equal halves, and proceeds to the membrane of the hard palate, where, though it grows thinner, it may be traced to the upper incisor tooth. On the posterior median line of the velum this streak, though less distinct, yet in like manner proceeds from the uvula to the posterior nasal spine. The microscope shows that it consists of large and chiefly longitudinal fasciculi of strong elastic fibres which are traversed by only a few blood vessels and nerves, and which spread out on either side of the median line of the velum, beneath its mucous membrane, towards the tonsils. It is observable that the middle portion is favourable to the considerable power of contraction which the uvula possesses in the longitudinal direction, and the lateral fibres to the mobility of the whole velum.

The streak to which, only for the sake of indicating its independent existence, Dr. Pappenheim gives the name of *ligamentum uvulae*, occurs as well in tender children as in adults, and sometimes splits anteriorly into two halves. — *Medicinische Zeitung*, July 14th, 1841. — Quoted in *Brit. and For. Med. Rev.*, January, 1842.

Bischoff on the Microscopic Examination of Lymph. — The fluid examined was taken from two large lymphatics in the neck of a dog. It was quite clear and pellucid, and after some time coagulated, but without assuming a reddish colour. It contained some yellow glistening globules of no great size, having an average diameter of from $\frac{3}{10000}$ ths to $\frac{2}{10000}$ ths of a Paris inch, the largest being $\frac{4}{10000}$ ths, the smallest $\frac{2}{10000}$ ths. A nucleus and envelope could not be distinguished in them. They were not all quite round like the blood-globules; nor were they granular and nodulated. They were not altered by water, acetic acid, or ether; but in caustic potash they vanished immediately. Similar globules with the same reactions present themselves, together with innumerable very small granules in the white contents of the thoracic duct and in the chyle. — *Müller's Archiv.*, 1839. In *Dr. Forbes' Medical Review*, Oct. 1841.

June 22nd, 1842. — *Professor Lindley, President, in the Chair.*

A PAPER was read by Dr. ARTHUR FARRE "On the minute structure of certain substances expelled from the Human Intestine, having the ordinary appearance of shreds of false membrane, but consisting entirely of confervoid filaments probably belonging to the genus *Oscillatoria*." The author stated that these substances had been passed by a patient, a middle-aged female, who had suffered lately slight indisposition, but in whose symptoms there was nothing remarkable except that for twelve hours before the passage of these shreds considerable pain and

uneasiness had been felt in the abdomen; unaccompanied, however, by any evidence of inflammation. The substance passed had so much the appearance of shreds of false membrane as to be easily mistaken for them. They were of a buff colour and varied in consistence, some portions being loose and rather flocculent, with a villous surface; others smooth, shining, and membranaceous. They had a peculiar elasticity, and the membranaceous portion when torn had a clear edge. These latter also presented a fibrous appearance to the naked eye, the fibres crossing at right-angles. When portions of this substance were examined under the microscope with a power of from 50 to 100 linear, they were seen to consist entirely of extremely delicate filaments, appearing like a mass of conferva. The looser portions had the usual tangled appearance of a mass of conferva, but in the more membranous flakes the cross-arrangement of the filaments was very evident. Examined with a power of from 300 to 500 linear, the filaments appeared of a pale green colour, and most of them exhibited the cross lines which mark their division into cells, as in *Oscillatoria* and other allied genera. The filaments were of nearly uniform size, measuring the $\frac{1}{7000}$ th of an inch in diameter, but of indefinite length. At their extremities many terminated abruptly being evidently broken across at a joint. Others were attenuated, being apparently the growing ends, while others had an appearance of branching dichotomously, which circumstance was to be explained, either by supposing that the filaments split longitudinally as well as transversely, which many of them had an appearance of doing, or else which is probably the true explanation, that the branches were overlying and united in part, while the extremities remained free. This union of the filaments in portions of their length was so firm in most instances as to resist separation when the parts were put upon the stretch. It was probably of the same nature as the union which takes place in *Zygnema*, but the filaments were too delicate to afford an opportunity of ascertaining the precise mode in which it is effected. It was observed very frequently to occur among the filaments, and gave to many of them the appearance of a dichotomous termination. The author was inclined to refer this singular production to the genus *Oscillatoria*, of which it appears to constitute a new species; but further investigation may show it to belong to a new genus. There was nothing in the history of the case to show the source from which it had been derived. The patient drank of the ordinary water which supplies London; but supposing the reproductive sporules to have been thus imbibed, they may have become so far altered in character during growth, deriving their supplies from an organized surface and thus becoming converted into an animalized material, as to exhibit a new and unknown appearance. The author concluded by referring to parallel instances of growths from various parts of the bodies of man and animals as discovered by modern microscopic investigations, but considered the fact now communicated as in itself new to science.

Bibliographical Notice.

Geology for Beginners. By G. F. Richardson, F.G.S. Of the British Museum, 8vo. pp. 530, London. Bailliére and Co.

THE author of this publication will be remembered by many of our readers as having furnished translations of several articles from the German on subjects of scientific interest, which have appeared in our pages. We have, therefore, peculiar pleasure in confirming the opinion both of the general and scientific press in favour of the publication, and in congratulating our esteemed correspondent on having produced a work in the highest degree meritorious and useful. Though designed ostensibly for beginners, it is calculated to afford information to the proficient, and even the experienced Geologist may derive instruction from a work so extensive in its plan, and we must add so successful in its execution. Justly conceiving that many of the treatises previously published assumed a degree of knowledge on the part of the student which was not always possessed, and knowing in fact that Geology is but another name for the knowledge of some half dozen sciences which pass under that general term, he has furnished a separate treatise on each, and the "beginner" may here meet with instruction on the varied and interesting subjects of Mineralogy, Physical Geology, Fossil Conchology, Fossil Botany, and Palæontology, with a sketch of the history of the Science, a vindication of its utility and importance, &c., history of the various formations, including directions for collecting and describing fossils, and generally pursuing the study. It is obvious that a work embracing such a variety of themes, must possess powerful and varied claims on public patronage; and we are by no means surprised at the eulogies which it has received from the public press, and the rapidity and extent of its sale. We must not omit to mention that among its varied dissertations the value and importance of microscopic investigation are especially enforced, and information of instructive nature imparted. We have noticed some imperfections, such as the too great prolixity of some chapters, contrasted with the brevity of others, together with some of those incidental faults unavoidable perhaps in a work of so extensive a character. They may be remedied in a second edition, and we doubt not the publication will reach many.

Microscopical Memoranda.

On the occurrence of the Nest ? of an Insect on the Human Hair.—On examining some human hair with the microscope, I was somewhat surprised to observe a small elongated cup-shaped nest, of a white colour and much resembling, when viewed with the naked eye, a scale of epithelium. It was situated within a quarter of an inch of

the bulb of the hair, and projected from one side; its form resembled that of the calyptra or cup of a moss—there was a decided opening at the apex, which was furnished with a well defined rim or margin; the orifice was filled with a number of small oval or roundish particles resembling eggs—these were piled one above the other in a conical manner. The whole interior appeared filled with similar bodies, which were easily recognisable through the diaphanous parietes of the receptacle. The nest, should such it be, was attached by means of a prolongation of its lower part, which encircled the hair, much in the same manner as wasps and some birds fix their nests to the branches of trees. Its size as far as could be judged was about $\frac{1}{80}$ th of an inch long, by about $\frac{1}{200}$ th of an inch broad. A sketch of this object will be found in a future plate of this Journal.—*Daniel Cooper, Fort Pitt, Chatham, July 13, 1842.*

[*Pl. VI, Fig. 1, a.*—The conical pile of eggs protruded from the marginal opening. *b.*—The body of the nest, with the contained ova seen through the walls. *c.*—The appendage by which the nest was fixed to the hair. *d.*—The bulb or root of the hair.]

Appendix to Mohl's paper on the Punctated Vessels of Plants.—The references to the Figures in Plate V, having been omitted in their proper place, p. 146, they are here inserted:—

Explanation of Plate V, Div. 4.

Fig. *a.*—Walls of a Punctated Vessel contiguous to cells in *Chilianthus arboreus*.

Fig. *b.*—Ditto, contiguous to another Vessel—the punctations are broadly extended and simulate a scalariform duct.

Fig. *c.*—Longitudinal section of walls of two contiguous Vessels in same plant.

Erratum.—At page 99, for *Plate IV, Div. 2 & 3*, read *Plate V, Div. 2 & 3*. We would recommend our subscribers to make this and other alterations with the pen, in order to save confusion.

Erratum.—At page 131, in the references to Plate III, for *Div. 6*, read *Div. 5*, and in the place of what is there printed, read,—*a.* Nucleated particles from the healthy human liver:—*b, c, d, e.* The same from the liver affected with fatty degeneration, shewing in each the light points or *nuclei*, with their *nucleoli*, and the dark contents of each which are the *fatty globules*.

[A reference to this page placed in the margin of page 99, opposite the explanation to the plate, will remedy this error.]

XXXI. — ON THE EXISTENCE OF OIL-GLOBULES AND CRYSTALS OF STEARINE IN THE CELLS COMPOSING THE ALBUMEN OF THE COCOA-NUT.

By Daniel Cooper, Assistant-Surgeon to the Forces.

It has been on several occasions a matter of some discussion among chemists, bearing more particularly on the wording of patent specifications, as to whether the Elaine and Stearine in the copra, or prepared cocoa-nut of commerce,—which is imported in considerable quantities from the East, for the purposes of expressing the oil for domestic and other uses and the stearine for the manufacture of candles,—existed in separate states in the substance of the nut. Having been a short time since consulted on this subject, I submitted a portion to microscopic investigation, with a view if possible to solve the question. The result of the examination was most satisfactory: affording one out of many valuable examples of the use of the microscope, as a means of solving hitherto considered mysteries connected with some of the most important of the Arts and Manufactures. It is well known, that when the copra, (as it is termed in Ceylon) is subjected to pressure at a low temperature, one of the principles of oily matter is obtained in a nearly pure state, this is doubtless *Elaine*—when, however, the pressure is exerted, at a temperature of between 70° and 80° Fahrenheit, in addition to the Elaine, there is obtained a quantity of *Stearine*—and if the heat be further increased, a still greater quantity of white matter is obtained, from which Cocoa-nut candles are manufactured.

At the suggestion of Mr. J. T. Cooper, who was professionally engaged at the time on the chemical nature of oils, and who from the above mentioned facts suggested in common, with Mr. Thomas Sturge, the idea of the Stearine and Elaine existing as two separate substances in the albumen or fleshy part of the Cocoa-nut, I was induced at their request to institute an examination—of which the following is an account.

Having made thin sections of the copra with a sharp scalpel, and placed them between two slips of glass with a little water, they were examined with a quarter of an inch Achromatic object-glass. In the interior of the elongated cells, of which the soft part of the nut is exclusively formed, could be perceived very small globules apparently of oil, scattered irregularly over their parietes,—in addition to which there

were also to be perceived very fine acicular shaped crystals occupying, and likewise irregularly distributed over the walls of the cells. These crystals, doubtless those of stearine, disappeared under the microscope, when gradual heat was applied, and were even lost altogether for some minutes, until the temperature became so much reduced as to cause them to be again deposited. By this process the stearine in the cells assumed a much more definite and regular crystalline appearance. The globules of oil (Elaine) are altogether independent of the acicular crystals above described. In the larger globules of oil, formed of numerous aggregated smaller ones, which were pressed out by enclosing the sections of the nut between the two slips of glass for examination, there were to be distinctly observed numerous plates or flakes of stearine of a still more regular crystalline form. These likewise were found to disappear when heat was cautiously applied, by radiation from a heated portion of metal held within an inch or more of the object as it lay on the field of the microscope, and became again deposited as the substance regained its former temperature.

From the facts mentioned above, and from the manner in which the examination was conducted for several successive times, I think there can be no question that the opinion of Mr. J. T. Cooper and Mr. T. Sturge is correct, and can at any time be satisfactorily demonstrated with a good quarter of an inch achromatic object-glass, by pursuing the course of manipulation just described.

Explanation of Plate XI, Div. 1.

Fig. 1. Globules of oil, formed by the aggregation of a multitude of smaller oil-globules, which have escaped from the cells (2.) of the albumen.

Fig. 2. A longitudinal section of the albumen of the cocoa-nut, exhibiting its cellular structure, and the globules of oil free within the cells. Fine needle-shaped crystals (?) also occupying the interior of the cells, which are supposed to be those of stearine, but are more evident in the globules of oil, Fig. 1, where they have aggregated together in a more definite and apparent crystalline state.

Fig. 3. Fasciculi of needle-shaped crystals of stearine which have escaped from the broken extremities of the cells, and have arranged themselves in the water as here exhibited.

Fig. 4. Acicular crystals of stearine, which appeared of a more definite form, after applying radiated heat from a piece of hot iron held for a few moments within half an inch of the slide.

XXXII.—*MICROSCOPICAL OBSERVATIONS ON THE MORPHOLOGY OF
THE PATHOLOGICAL FLUIDS, BY DAVID GRUBY, M.D.—No I.

Translated from the Latin by S. J. Goodfellow, M.D., &c.

THE translator undertook the translation of the following observations last winter, as an occupation during a slight indisposition, and for the purpose of being able the more easily to verify them by further examination, as soon as an opportunity should offer itself. This opportunity, he regrets to say, has not been afforded to him; and believing that the subject merits further investigation, he has been induced, through the kindness of the Editors of this Journal, to adopt this method of bringing this little work to the notice of microscopical pathologists.

The observations were made during day-light, by Plössel's microscope, the diameter of the objects being increased 400 times. For diluting the objects, distilled water was used, and for changing their physical characters pure pharmaceutical re-agents.

In the following work are contained:—

1. Observations concerning the morphology of mucus.—Plate 7, figs. 1—22; figs. 23—26. Plate 9, figs. 51—53.
2. Observations concerning the morphology of pus.—Plate 10, figs. 27—41; figs. 42—50, 52, 54—58; figs. 59—64, 72—77.
3. Observations concerning plastic lymph and plastic exudation.—Plate 10, figs. 65—71.
4. Observations concerning a white, pellucid, and fluid exudation. (Serum).—Plate 10, figs. 78, 79, 81.
5. Observations concerning ulcers and mesenteric glands of abdominal Typhus.—Plate 10, figs. 72—77. Of the spleen, fig. 62.
6. Observations concerning lobular inflammation of the placenta.—Plate 10, fig. 80.

* Observationes Microscopicæ ad Morphologiam Pathologicam, auctore Dr. Davide Gruby. Morphologia Fluidorum Pathologicorum. Tomi primi pars prima. Accedunt Tabellæ septem et Tabulæ litho sculptæ quinque. Vindobonæ apud Singer et Goering, 1840.—The Translator has thought it better to omit the short introductory essay, in which the Author has given a cursory review of the various discoveries in anatomy, by means of the simple and compound microscope, with a list of the names and works of the principal anatomists who have had recourse to their aid in the prosecution of their anatomical researches; because he feared that it would occupy too much of the space allowed to him in this Journal, without a corresponding advantage to the reader.

Of Normal Mucus.

Mucus taken from the healthy mucous membrane of the nostrils, settles into a greyish-white fluid, somewhat thick, easily drawn into threads, dries when exposed to the air, leaving a hard, fragile, transparent, greyish scale. Water does not dissolve it; rubbed with water for a long time it is loosened, softened, and swelled, and it is no longer to be drawn into threads. A small portion spread upon glass, and examined by means of a microscope, appears:—

1. Amorphous and greyish-white, with greyish black points irregularly scattered in it, (which I believe to be heterogeneous substances, from the air brought into contact and united with it.) Agitated for some time in distilled water, the blackish grey points are dissolved.

2. Moreover there are observed yellowish-white, round, or oval globules, two to four times more transparent than the red particles of the blood. Globules taken from the anterior part of the mucous membrane of the nostrils, appear without primitive molecules; but, investigated from the posterior part of the same membrane, they appear endowed with very small ones; dried in air they are rendered irregular and more pellucid; the primitive molecules disappear at the same time; exposed to distilled water, they are not changed, nor are their envelopes broken. Plate 7, figs. 1 and 2.

3. It contains lamellæ and cells of epithelium of a greyish-white or whitish colour, transparent, of an oblong or angular form, $\frac{1}{40}$ to $\frac{1}{30}$ ''' long, $\frac{1}{50}$ to $\frac{1}{100}$ ''' broad; the greater part of their surface is irregularly folded with here and there very small molecules deposited; they enclose a central nucleus, or a globule less transparent, exceeding by two or three times the size of the blood-discs, mostly oblong, less frequently round; dried in air, the little cell of epithelium becomes transparent, the opaque nucleus remaining. Distilled water does not change them. Plate 7, fig. 8, *a, b, c*; fig. 11, *b*; fig. 12, *c*; fig. 17, *c*; fig. 25, *d*; Plate 9, fig. 41, *e, f*; fig. 55, *b, c, d, e, f, g, h, i*; fig. 53. *a*.

If the cells of epithelium have been treated for about five minutes with a small drop of concentrated acetic acid, sp. gr. 1,030, I have observed no change. The same occurs with solutions of oxalic and tartaric acids: sulphuric acid 1,090; diluted nitric acid 1,170; also with diluted hydrochloric acid 1,070, and liquid chlorine 1,000.

The same occurs with hydrochlorate of ammonia, hydrochlorate of barytes, nitrate of potash, nitrate of barytes, sulphate of potash, acetate of ammonia 1,015, acetate of potash 1,200, and soda, with solutions of sulphate of iron and sulphate of copper; but nitrate of silver tinges the cell of a brownish colour.

Concentrated muriatic acid 1,200, nitric 1,170, sulphuric 1,090, butter of antimony, and oil of tartar, quickly renders the cell of epithelium perfectly pellucid, so that it is withdrawn from all further observation.

Of Mucus produced from irritation of Mucous Membranes.

The mucus of an irritated mucous membrane of the nostrils is white, pellucid, scarcely more consistent than the albumen of a hen's egg; exposed to the air the greatest part evaporates, and a very thin pellucid lamella remains. Distilled water is easily mixed with it.

Under the microscope, besides a few cells of epithelium, it is seen to contain round globules from four to five times larger than those of the blood; a few of them are of a white colour, perfectly round, with extremely thin pellucid envelopes, enclosing very small molecules.—Plate 7, figs. 3, 4; figs. 11, 12, 18—20.

Of Mucus produced from Catarrhal (i. e. lighter) Inflammation.

Mucus from catarrhal (i. e. milder) inflammation of the mucous membranes of the nostrils, conjunctivæ, fauces, larynx, bronchi, urethra, vagina, and of alimentary tube, has a greater consistence than that produced from *irritation* of these membranes. It is transparent, very tenacious, yellowish-white, thick, drawn out to a thread-like glue, dries more slowly in air, and a turbid, greyish-yellow elastic lamella remains. In distilled and river-water it falls to the bottom (if bubbles filled with air shall not have been mixed with them); exposed for a longer time to water, it is not changed, except that it swells somewhat and becomes whiter; exposed to a flame it burns and emits an empyreumatic odour.

Investigated by means of the microscope, I beheld:—

1. An amorphous greyish-white mass, not changeable by water.
2. Spherical whitish-yellow globules, the larger the quantity in the mucus the more intense the yellow colour; the diameter of the globules taken from a catarrh of the larynx exceeded eight times that of the blood-discs. These globules intimately cohered with the amorphous mass in which they appeared immersed, and were composed of a very thin diaphanous envelope, which was easily broken when made tense by shaking it with water; not *agitated* in water it is not broken, on account of the tenacious amorphous mass in which the globules are found immersed. In the middle, and oftentimes out of the centre towards the edge, is seen a perfectly round vesicle, which exceeds in size twice the diameter of the blood-discs; it either appears to be empty or filled with some pel-

lucid fluid. This vesicle, on account of the place which it occupies, may be called the central vesicle. In every globule there appear little points or very small globules, scarcely larger than one-sixth the diameter of the blood-discs, transparent or diaphanous, called molecules, and dispersed without order.

The quantity of these globules, and their magnitude, vary. We shall speak in another and more appropriate place concerning these.

When the globules have been dried, they change their round form into that of an irregular polyhedron, marked with more pellucid margins; in the middle there remains a granular yellowish substance, which surrounds a central vesicle, at first turgid, but by drying becomes changed into a white pellucid spot.—Plate 7, fig. 5, 6.

Sometimes two central vesicles are seen.—Plate 7, fig. 6, *d*.

Of Mucus produced by a more intense Inflammation of Mucous Membranes.

Mucus secreted from mucous membranes affected with a more intense inflammation, is of a deep yellow colour, easily drawn out into threads without any order. It is opaque, and when dried, leaves a yellow, transparent, brittle substance; in distilled or river-water it sinks to the bottom, and forms flocculi: agitated with water it renders it turbid, but I saw the flocculi themselves, of a white colour, sink to the bottom. The flocculi, washed a long time in water, did not render it more turbid; those made of a lighter colour swam upon the water, and enclosed even then a few globules. The mucus, when dried, burnt with a flame. The mucus from opthalgo-blennorrhœa, acute urethral blennorrhœa, acute vaginal blennorrhœa in a puerperal woman is here alluded to.

Investigated by the microscope this mucus consists:—

1. Of a small quantity of a whitish amorphous mass, not soluble in water.

2. Of innumerable yellow globules, partly with, partly without central vesicles.—Plate 7, figs. 7—10, 12,* 14, 22, 23, 25. These globules, exposed for a long time to distilled water, swelled and became whitish. After the first minute they are broken, and the contained molecules are sometimes quickly, at other times slowly expelled, then sometimes leaped out, as if they were controlled by a physical law. They did not accumulate about the unchanged central vesicle, but every where exercised, for a long time, a molecular motion.

3. Cells of epithelium were rarely observed in this mucus; and if any occurred, they were round, full, and here and there with difficulty distinguished from the globules of mucus.—Plate 7, figs. 14, 15.

Of Mucus from Mucous Membranes affected with Chronic Blennorrhœa.

Mucus from chronic blennorrhœa of the vagina and urinary bladder, is yellowish-white, but little ductile, easily renders water turbid, and white flocculi remain in contact with the bottom of the vessel. I observed other properties like those with mucus produced from a more intense inflammation of membranes.

Under the microscope there appear:—

1. A small quantity of a ductile amorphous mass.
2. Very copious yellowish-white globules, of which some seem composed of an envelope, very small molecules, and central vesicles, some of an envelope and central vesicle, and lastly others of very small molecules only, and destitute of all covering.—Plate 7, figs. 20, 22.

Of the Lochial Discharge.

Shortly after parturition, the lochial discharge, rightly investigated, exhibits a sanguineous colour, gives out an animal odour, is but little ductile, and dried in the air leaves a red, friable mass. Treated with distilled water, three substances are observed:—

1. A reddish-white soluble substance, (Hæmotosine.)
2. White flocculi quickly falling to the bottom, (Fibrine.)
3. Yellowish-white flocculi suspended in the water, (Vaginal mucus.)

Investigated by the microscope, it consist:

1. Of a ductile amorphous mass.
2. Of blood particles.
3. Of mucous globules, composed of an envelope and primitive molecules.
4. Of epithelium.

When we compare mucus secreted from the vagina during parturition, Plate 7, fig. 2, which consists of small globules *a*, *d*, enclosing primitive molecules; also, of small globules *e*, enclosing two larger molecules, with mucus secreted 13 hours after parturition, Plate 7, fig. 12, we shall perceive an essential difference between mucus produced from the healthy vagina, and that from the same organ when irritated.

On the *second* day, globules endowed with central vesicles, appear; and, in proportion as the uterus shall have been injured, so in proportion will these globules be found increased in quantity. As the discharge becomes paler, the number of blood particles decreases, and the quantity of the larger globules on the contrary, increases.

On the *third* day after parturition, the reddish discharge contains many yellowish-white globules, provided with central vesicles and molecules; the quantity of blood particles decreases, and that of the ductile amorphous mass increases, (proper mucus.)—Plate 7, fig. 12*.

On the *fourth* day after parturition, the discharge is but slightly reddish, contains white flocculi, easily drawn into threads (of mucus), in which there are irregular, more obscure globules (corrugated epithelium), and some with central vesicles. A very few blood-particles are also contained in it.—Plate 7, fig. 13.

On the *fifth* day after parturition, the mucous discharge is yellowish-white, the globules which are found in it are white, and even ten times larger than the blood particles. There are very few or no small molecules included in them, and the central vesicles have disappeared, but I observed an increased number of larger primitive molecules in them.—Plate 7, figs. 15, 16.

From the *6th* to the *13th* days, the lochial discharge is white, consists of white, perfectly round globules, provided with the smallest primitive molecules without central vesicles or larger molecules.—Plate 7, figs. 18—20.

I have observed peculiar forms in a diminished discharge of the lochia, when inflammatory puerperal fever has attacked the mother; the central vesicle, for instance, exceeding by four or five times the magnitude of the blood particles, has been provided with primitive molecules, the globules, on the contrary, enclosing this vesicle being entirely destitute of them.—Plate 7, fig. 21.

Here and there, however, when the secretory process had been retarded, or when a more difficult parturition produced metritis, the central vesicles were found in the yellowish-white lochial discharge on the 5th and 8th days after parturition, and even beyond that time.—Plate 7, figs. 14, 17.

Of Dysenteric Mucus.

Mucus, discharged from the intestine in the commencement of the dysenteric process, is limpid, easily drawn into threads, scarcely differs from the mucus produced from a mild diarrhoea; but the dysenteric process increasing, reddish and very thick mucus is evacuated. The red colour is caused by a mixture of the red particles of the blood with the mucus produced from inflammation of the mucous membrane. In the acme of the disease, the mucus is seen altogether as green; it no longer encloses globules of blood, but white, almost pellucid, globules deprived of all primitive molecules, having large central vesicles filled

with the smallest molecules, (I have observed this form in the lochial discharge of a puerperal patient.—Plate 7, fig. 21, and in the purulent exudation of recent purulent peritonitis, fig. 56.) I have, moreover, beheld peculiar green bodies intermixed with the dysenteric mucus.

See the explanation of Plate 7, fig. 25.

OF SPUTA.

The mucus ejected from coughing differs according to the character, extent, and stage of the pathological process; hence I shall first speak of the sputa from normal inflammation; secondly, of sputa from anomalous inflammation, and also on the appearance of sputa produced by the tubercular process.

Of Sputa generated by Normal Inflammation.

Sputa produced in the commencement of a catarrhal affection of the air-passages, are found to be white, pellucid, thin, easily drawn into threads, and here and there they disclose within themselves a few small flocculent greyish nubeculæ. The quantity of these sputa bears a direct relation with the extent of the pathological process.

Investigated by the aid of the microscope, the white pellucid fluid contains a very few round globules, filled with primitive molecules, and many cells of nucleated epithelium; the globules as well as the cells appear immersed in the pellucid fluid (proper mucus), but the greyish flocculi are composed of copious round globules filled with primitive molecules, and linked together with the proper mucus.

The catarrhal process increasing, the greyish flocculi receive an increase, which at length, from a yellowish-white, become tinged of a deeper yellow colour; the more the flocculi increase, the more the quantity of white fluid mucus decreases, the sputa becoming globose, and extremely tenacious.

The flocculi, investigated under the microscope, are composed of round globules filled with primitive molecules and a central vesicle. These globules appear linked with extremely tenacious mucus; but the white mucus (properly mucus), is a white amorphous substance, easily drawn into pellucid threads, which disclose cells of nucleated epithelium, and a few globules of a yellowish-white colour, endowed with the smallest molecules and a central nucleus. The inflammatory process decreasing, the quantity of globular sputa decreases; they acquire a somewhat whitish colour, until, the inflammatory process being finished, all yellow secretion ceases.

Microscopico-Chemical Investigation.

The globules contained in yellow mucus, consist of smooth, very thin envelopes, in which again primitive molecules, and a single or double central vesicle are seen. The magnitude of the globules exceeds by six or eight times that of the blood-discs; but the diameter of the central vesicles scarcely equals it.

Globules exposed to distilled water increase in volume, although they may all have been freed from the adhering mucus; the envelopes break, the central vesicle and primitive molecules remaining.—Plate 7, fig. 24.

Acetic acid 1,030 dissolves the envelopes and primitive molecules, but the central vesicles remain intact, and more than this, they are seen more clearly, but their number increases from one to six.—Plate 6, fig. 82.

Oxalic acid dissolves the envelopes, the central vesicles from two to five in number remaining.—Plate 6, fig. 85.

Tartaric acid quickly dissolves the envelopes; the central vesicles, observed of a white colour, remain.

Diluted nitric acid 1,170, corrugates the globules, and tinges them of a deeper yellow colour.—Plate 6, fig. 83, *a*.

Diluted hydrochloric acid 1,070, corrugates the globules.

A dilute solution of the nitrate of silver 1,075, corrugates the coverings of the globules, and leaves them tinged of a yellowish colour.—Plate 6, fig. 84.

Concentrated solution of nitrate of silver 1,275, at first dissolves the coverings and the primitive molecules, the central vesicles remaining, from one to four being seen clearly; but in a longer time the central vesicles themselves become dissolved.

Solution of pure potash 1,350, dissolves the globules, and a white pellucid mucous fluid remains.

Spirit of caustic sal ammonia 0,980, produces no change.

Lime water occasions no change.

Spirits of wine 0,830, contracts the globules.

In crude pneumonic sputa, white, irregular, turbid particles are found intermixed with mucus, which are composed of an entire patch of cells of non-nucleated epithelium, joined to each other in symmetrical order, on whose surface irregular globules (plastic exudation) are found.—Plate 6, fig. 86.

Tenacious mucus of yellow globose sputa, which embrace or enclose the globules above described, appears, when submitted to the microscope, white, almost pellucid, and free from globules.

Distilled water does not produce any change in it.

Treated with nitric acid 1,170, it forms yellow filaments, decussating among themselves in different directions, and marked with irregular, obscure margins. Plate 6, fig. 83, *b*.

The same happens if it have been treated with hydrochloric acid, 1,070.

Solution of nitrate of silver 1,075, forms filaments, which after a little time are dissolved.

Contentrated acetic acid 1,030,	} Occasion no change.
Solution of oxalic acid,	
Solution of tartaric acid,	

Of Sputa generated by Anomalous Inflammation, and from the Tubercular Process.

Sputa generated by the tubercular process, differ according to the nature, the extent, and the stage of the disease.

The tubercular process is three-fold :—

1. Miliary tubercular process.
2. The tubercular process of infiltration. And,
3. The tubercular process, forming solitary tubercles, distinguishing by turns the characteristic sputa which each process forms.

Of Sputa ejected from the process forming Solitary Tubercles.

A solitary tubercle, generating in the texture of the coats of the air-tubes, or in the cellular tissue surrounding the bronchi or blood-vessels, only affects the pulmonary secretion so as to increase it, and also presses upon the coats of the intermediate and capillary blood-vessels, as well as upon those of the minute bronchial ramifications, so much so as to impede or totally put a stop to the circulation of the blood, as well as air in that small portion of lung lying next the tubercle ; the product generated from the irritation of the mucous membrane, differs in no respect from that of a mucous membrane irritated by the application of cold, therefore there is as yet no *qualitative* difference between the sputa of an incipient catarrhal process, and those of a commencing tubercular process ; but a *quantitive* difference is given, for the sputa ejected from an incipient catarrh, are more copious than those which were expectorated from the irritation of a solitary tubercle.

The tubercle increasing the quantity of sputa increases until the tubercle becomes softened, which having taken place, besides the concocted or puri-form sputa, there are found yellowish-white and finely

granulated particles mixed with the white mucus ; or, yellowish-white oval lenticular particles, whose longest diameter scarcely exceeds the half of a Viennese line adhering to the bottom of the smooth vessel in which the sputa are accumulated.

It is seen by the microscope, that these yellowish-white particles are a compound of roundish or ovate lenticular spheres, gashed globules, and mucus. The lenticular spheres are from the same size to ten times larger than the globules of pus ; they present, for the most part, a smoothish surface, and in almost all, obscure striæ, running concentrically, are detected.—Plate 6, fig. 89. Some of these spheres are fissured once or oftener from the periphery towards the centre, the broadest part of the fissure continually decreasing, until it altogether ceases far in towards the centre.—Plate 6, fig. 90. They are easily broken, and break with angular margins, Plate. 6, fig. 91 ; whereas, if one look closely at the face of the fracture, he will perceive the lenticular sphere to be composed of concentric lamellæ, resembling a bulb of garlic.—Plate 6, fig. 92.

The lenticular spheres fall to the bottom in distilled water. Dried for a long time in air, they are not changed, with the exception of a slight diminution of their diameter.

They are not changed by distilled water.

A solution of caustic potash dissolves them.

They are in no respects changed by liquid ammonia 0,910.

Concentrated acetic acid 1,030, and solutions of tartaric and oxalic acids produce no change.

In dilute nitric acid all their diameters are enlarged from three to five times, and the concentric striæ disappear ; they swell like inflated bladders, become semi-transparent, are bent in a different manner, and ultimately disappear altogether.—Plate 6, figs. 94, 95.

They are not changed in hydrochloric acid 1,070.

Carbonate of soda, acetate of lead, prussiate of potash, and ammoniacal sulphate of copper, do not change them.

Solutions of the nitrate of silver 1,275, change them in the same manner as nitric acid, only they do not disappear so quickly.

Infusion of galls, and pure alcohol 0,830, produce no change.

As long as the softened tubercle shall not have thoroughly been thrown off, so long are the lenticular spheres mixed with the sputa.

The tubercle being expectorated, the sputa again differ according to the difference of the pathological process ; for, if the tubercular process has been local, the parietes of the cancer secrete globules of pus, which are ejected in union with the mucus of the irritated or inflamed

mucous membrane of the air-passages, until the contracted parietes and the cavern, forming a cicatrix by granulation, become consolidated, the lenticular spheres being no longer detected in the sputa.

But if the tubercular process (the individual labouring from a tuberculous dyscrasis), is not quieted by the ejected tubercle, the lenticular spheres are found constantly intermixed with the sputa.

There are seen in the tuberculous sputa, besides the lenticular spheres now described, and white tenacious flocculi before noticed, white mucous and granular-looking shreds. Investigated by the microscope they contain cells* composed of tetra or pentagonal margins, with obscure or unequally yellow centres, the striated margins having the diameter and texture of the intermediate vessels (capillaries).—Plate 6, figs. 87, 88. Besides these cells, there are here and there found yellow cylindrical fibres marked with black transverse lines (muscular fibres).—Plate 6, fig. 96,

Sputa produced from other inflammations of an anomalous character, will be treated elsewhere.

Of Urethral Blennorrhœa.

The fluid, which is secreted in the beginning of a catarrhal inflammation of the mucous membrane of the urethra, is white and not easily drawn out; contains very few globules which are four times larger than those of the blood, and composed of a smooth, transparent, very thin envelope, filled with the smallest molecules.

On the 3rd day of the disease, the secreted fluid is observed to be thicker, and of a yellowish-white colour. It is composed of numerous globules, for the most part perfectly round and yellowish-white, which are transparent, smooth, very thin envelope, the smallest molecules, and here and there a central vesicle.—Plate 7, fig. 7.

On the 9th day after the infecting coitus, the puriform fluid in preputial blennorrhœa contains numerous yellow globules, three or four times larger than those of the blood, some of which are seen composed of an envelope, and the smallest molecules, others of an envelope, the smallest molecules, and the central vesicle perfectly round or oblong.—Plate 7, fig. 8.

On the 21st day, the globules contained in the yellow secretion are very numerous, and are composed of a smooth envelope, the smallest molecules, and the central vesicle. They rapidly swell in distilled

* Infiltrated pulmonal cells, (cellulas pulmonales infiltratas.)

water, the envelope quickly breaks, and the primitive molecules are seen accumulated around the central vesicle.—Plate 7, fig. 10.

On the 30th day, the thick fluid is perceived of a yellow colour, and few globules; and on the 40th day after the infecting coitus very few globules, and those for the most part ruptured, are found in the white and thinnish fluid.

(To be continued at p. 225.)

Extracts and Abstracts from Foreign Journals.

[From Müller's Archives, 1842.]

Meyer on the Existence of a Distinct Membrane surrounding the Yelk in the Ova of Mammalia.—Repeated observations made principally on the ova of the pig, have satisfied Dr. H. Meyer of the existence of a peculiar yelk membrane. He found this fact to be most clearly demonstrated in ova taken from ovaries which had been a few hours in alcohol.

The appearances upon which the existence of this membrane is presumed are as follows:—

1. The yelk granules are not in immediate contact with the inner surface of the chorion, but cease with a regular border, at a greater or less distance from it.—2. The interspace thus formed is filled with a yellowish granular matter.

Several experiments have proved, that this matter is a distinct membrane.

1. In one instance, on the bursting of an ovum, the yelk granules passed through the rent in the chorion, not scattered or separated, but in a mass, which was distinctly seen to be kept together by an envelope, by which it was attached to the edges of the rent, forming a sort of hernia; and within the almost empty chorion, a plicated, pale-coloured granular looking membrane was distinguishable.

2. Although the presence of the interspace between the yelk and the chorion does not prove that the former is enclosed in a peculiar membrane, yet it does prove that it is surrounded by something more than the chorion. That this additional envelope, however, is really a membrane, is proved, partly by the above observations, and partly by the result of an easy experiment.

3. If a drop of a solution of caustic potass be brought in contact with an ovum under the microscope, the chorion is very easily dissolved, yet the yelk remains unaltered; and it can now be readily proved, that the yelk granules still retain an envelope, by moving the glass covering the object, backwards or forwards, or by causing it to make pressure upon it, and increasing the pressure until the covering is ruptured and the yelk granules escape, the envelope remaining in the form of a granular, but otherwise structural membrane.

Dr. Meyer remarked, as had previously been done by Wagner, that

the space between the yolk and the chorion, or in other words that the thickness of the yolk membrane was increased by the absorption of water.

He further observes, that every part of the chorion is equally soluble in the caustic alkali, which circumstance may conduce to prove that it is a homogeneous membrane, and not a layer of albumen contained between two membranes, as some have supposed.

A figure, illustrative of the above described appearance, will be found in *Müller's Archives*, Tab. II. fig. 7.

Oschatz on a New Cement or Lute for Microscopic purposes.—M. Oschatz recommends, as a cement or lute for glasses containing microscopic objects, a composition of sealing wax and whitelead,—and for the purpose of keeping apart glasses, so as to prevent injury by their pressure upon delicate objects,—rings made of a vegetable pith, such as is afforded by the *Helianthus annuus* or the Chinese rice-paper.

M. O. has also invented, but not described, an instrument for cutting thin and uniform slices of different substances for microscopic purposes,

Eschricht on Dicerus rude.—M. Eschricht, in a letter addressed to Müller, regrets the publication of a note of his on the so-called *Dicerus rude*, (and which appears in our present volume, p. 153.) He states, that a more attentive examination has caused him to arrive at very different conclusions on the subject.

The pretended Entozoa correspond in every respect with Sultzzer's figures, but the explanation is altogether wrong, as they are in fact only parts of the fruit of *Morus nigra* or the common mulberry.

The letter proceeds then to compare the different parts of that fruit with Sultzzer's figures, and to point out their close correspondence.

[From the *Comptes Rendus*, June, 1842.]

Glüge on Entozoa in the Vessels of Frogs.—M. Glüge has found, in the blood of frogs, an entozoon allied to those which constitute the genus *Proteus* of Ehrenberg. This animal, the existence of which in the blood of *Salmo fario* had already been discovered by Valentin, (vide p. 87) appeared to M. Glüge to undergo, in the blood of frogs with which it circulates, metamorphoses similar to those which have already been announced with regard to other Entozoa.

A second observation of M. Glüge refers to another entozoon, found in great abundance in the lungs of frogs, the *Ascaris nigrovenosus*. M. Glüge considers that the organ, whose situation is indicated externally by a black line, and which has hitherto been looked upon as the intestine, is in fact the ovary, and in it ova may be distinguished in different states of development, sometimes even containing an embryo coiled up. He has also observed the ova of this entozoon in the lungs of frogs, in which the adult animal was not present; and thence con-

cludes, that these entozoa are introduced in the state of eggs, and probably by respiration, into the lungs of the frogs infested by them.

Dr. Fick of Marburg describes a case in which he found the nerves of a diseased limb transformed into adipose tissue.

The disease appears to have commenced in the joints of the tarsus, and the whole limb to have become much swollen and infiltrated, and the affection had existed a long time, when it was amputated. *Dr. Fick* prepared portions of the *Saphenus magnus* and *Sciatic nerve*, several inches in length, tracing the larger branches as far as possible into the diseased tissues; and on careful microscopical examination, he found an unusual quantity of fat deposited among the fibrillæ constituting the nervous branches; and on tracing these fibrillæ farther into the diseased tissues, he found them to become fewer and fewer in number, their place being occupied by fat globules, which, especially in the smaller branches, appeared to be formed on the inner surface of the nervous sheath. At some distance from the diseased tissues, many primitive fibrillæ could be observed running through this fatty matter, which gradually, however, became fewer in number, and finally, in the whole sheath none were to be observed, it being occupied entirely by the fat.

Göppert on the Spontaneous Movement of the Sporules of Nemaspora Incarnata (Pers.)—It is no longer doubted at the present day, that the sporules of many Algæ, when mature, are endowed with the power of spontaneous motion, not referrible to any external or physical cause, but to be considered merely as an evidence of life. Similar motions in the sporules of Lichens have been seen by *M. Link*, and especially in the seed-vessels of *Limboria stricta*, in which he perceived a slowly progressive motion, which was still evident in specimens which had been gathered thirty years.* *Meyen* observed, that the sporules of *Mucor mucedo* occasionally moved when placed in water. In December of last year (1840), *M. Oschatz* showed to *M. Göppert*, sporules of *Phallus impudicus* enclosed in water, and which, although they had been removed from the plant eight weeks, presented a very slow but distinct rotatory motion, and which continued evident even after they had been in the water for a whole year.

On the first of October, 1841, *M. Göppert* placed in water some filaments of the remarkable *Nemaspora incarnata (Pers.)*, which were growing upon some willow branches standing in water in his chambers. The water soon dissolved and washed away the gelatinous matter, which probably contains the spores, and gives the mould-like form to the plant, leaving the extremely minute, elongated, and pointed, white-coloured, transparent sporules, free. They require, for their satisfactory examination, a power of 250 linear. To his no little astonishment, *M. Göppert* observed, that these bodies possessed lively motion, so that they rotated not only in a horizontal, but also in a vertical direction, and

* *Froriep's Notiz. XII. No. 293, p. 104.*

had even a power of locomotion, confined, however, to a very small compass. In the vertical position they assumed the appearance of black points, so that at first he supposed two sorts of sporules to be present, until, upon closer examination, he remarked that the change in the aspect under which he viewed them gave rise to this deceptive appearance.

He mounted some of these bodies in the manner described by M. Oschatz, and on 20th of November, or nearly eight weeks afterwards, the motion still continued as active as at first. Specimens of this plant, which had been collected in 1822, upon being macerated in water, afforded the same phenomena, although the motions were certainly less active.

[From the *Annales des Sciences Naturelles*, April, 1842.]

Unger on the Origin of Spiral Vessels.—In the plant just emerging from the embryo condition, in which state only can the examination be made, there are two parts especially, the exact study of which throws the most light upon the development of the spiral vessels.

These two points are the summits of the stalks, with the buds and the extremities of the principal and of the lateral roots,—in other words, the two poles of the vegetable axis.

Before entering, however, into the details of this subject, it is necessary to understand fully the meaning of the expression *spiral vessels*, very different views in this respect having been entertained by authors.

In the sense attached to it by the old phytotomists, two sorts of organs are included; the one of which is distinguished by the presence of annular or spiral fibres, and is in the form of a simple annular or spiral vessel; whilst the other, instead of simple fibres, has them larger and more ramified, giving, in consequence, to the vascular membrane, a reticulated or sieve-like appearance; vessels of this kind have been denominated reticulated or striated, and of them the true porous ones are only a modification.

Since all these fibrous tissues are not found, as asserted by Meyen, in the original formation of the vascular wall, but only become deposited at a later period, on the originally homogeneous membrane of that part, it necessarily results, that all the forms of vessels above mentioned, originate in a similar manner, as far as regards the more essential points.

Direct observation, and the comparison of younger formations with those more advanced, indicate that the fibrous tissues belong, in some way, to a secondary layer, deposited on the primitive membrane of the vessel, and determine the manner in which this increase in the thickness takes place.

From this it appears certain, that the spiral vessels are not truly elementary organs, but that they are on the contrary composed of numerous cells, superimposed perpendicularly, and more or less cylindrical or

prismatic, and which, by their junction, form a continued whole; and in a morphological point of view, they are distinguished by this alone, perhaps, from the analogous spiral *cells*.

Two propositions, then, may be stated :—

1. That the wall of the vessels is like that of cells originally, homogeneous.
2. That the organization of the vessels, at their first origin, consists in cells arranged in a linear series.

M. Unger's conclusions are founded, principally, on observations upon the organization of the radical extremity, and especially of that of the fibrous roots of monocotyledonous plants.

He preferred for this purpose the sugar-cane.

Every fully-developed root presents in its interior a medullary part, surrounded by a vascular, or ligneous one, and externally a cortical. All these parts from the summit to the base preserve the same relative position with respect to each other. During the growth of the root, the medulla undergoes the least change; the bark rather more, and the vascular part by far the greatest; and it is to the changes in this part that the paper more particularly refers.

The ligneous substance of the root, like that of the trunk, is formed of vessels and of elongated cells, with walls of greater or less thickness. In the root of the sugar-cane we observe, near the extremity, eight larger vessels, distinguishable, in a transverse section, by their size; towards the exterior, several others of less diameter are visible, but in this situation not well defined. At the distance of about a line from the radicular extremity, the number of the larger vessels is nine; at about five inches there are ten; and at the base of a root twelve inches long, they amounted to twelve. On a successful section of the extremity of the root being made, which should not only divide it into two equal parts, but should also touch upon one of the eight larger vessels, no difficulty will be found in recognizing upon the section, the origin and successive development of these parts. It may then be observed that the vessels become contracted, by insensible degrees, towards the extremity of the root; but that at the same time the cells of which they are composed, become shorter and shorter, until their width is more than double their length; from which point, their transverse diameter rapidly diminishes, and finally their dimensions, in either direction, are nearly equal; and they have now become so small, that they can no longer be distinguished from the adjacent cells.

The extremities of the vessels, however, are not found, as might be supposed, at the very extremity of the root, but are situated a short distance from it; and, what is more curious, the extremities of all the vessels converge to one point, to reach which they are bent considerably. Moreover, as the rest of the cells composing the tissue of the radicular extremity, and which, like those of the vessels, are disposed in linear series, also converge to the same point, it is to be understood, that not only the vascular, but also the cellular formation of the root commences in, or starts from this point, which may with some reason be

considered the *punctum saliens* or *macula germinativa* of the radicle, and which, in consequence of its being the precise point at which all the organization commences, is continually in process of development.

The root of *Saccharum officinarum* teaches the following facts:—

The cells of the *punctum vegetationis*, examined under a high power, are the smallest of the root. Their walls are extremely thin and delicate, so much so, that no doubling can be seen between adjacent cells. They contain a homogeneous, non-granular mucilage, which differs but little from the wall of the cell, and represent in some measure the latter in an amorphous state. The cavities of the cells are not equal in all, which would seem to indicate, that in the larger cells partitions are formed which divide the space into two or more compartments. No traces as yet of nuclei can be observed, which appear in cells a little removed from this situation. From this it results, that this point, made up of elementary parts very small and perfectly homogeneous, is evidently organized, and that it differs from parts more fully developed, and into which it is continually being transformed, only by the tenuity of the walls of the cells, and by their homogeneous mucilaginous contents.

Having thus traced the commencement of the larger vessels, it remains to pursue their development in the ascending scale, and the mode in which the vascular utricles, by their apposition, constitute a perfect canal. About 77 millim. from the extremity of the radicle, the vascular utricles are as wide as they are long; their walls are of extreme tenuity, and they contain a mucoid matter, beginning to become granular. At the height of about a line, the cells are five or six times longer, but have not increased in width. They still contain a mucilaginous mass, in which, however, traces of organization can be recognized. It begins to coagulate into vesicles, which, when magnified, represent a vascular or cellular net-work. At the height of 12 centim., the length of the cells is again doubled, while their width remains the same. The membrane composing them also shows the same homogeneous conformation; but there are now observable, added to its contents, some cellular nuclei. It is not till they have reached the distance of four inches from the extremity of the radicle, that the walls of the vessels appear of any thickness, and at the same time become furnished with rudiments of pores. The smaller vessels, however, become more fully developed, even at the distance of two lines from the extremity. It is a remarkable fact, that those vessels which soon assume the reticulated form, present at first, in the form of their secondary layers, only a spiral disposition of the molecules composing them, in which respect they closely represent the type of simple spiral vessels. The metamorphosis in this case is easily explained, by supposing a partial *engorgement* of the spaces left vacant between the spiral fibres.

At five inches from the extremity, there is at last evident an organization in the membrane of the large vessels; nevertheless, even here the spiral band is not at first present, as in the small vessels, but the secondary (or internal) membrane is studded with numerous minute pores, giving to the vessels their reticulate appearance, similar to that of the porous vessels of dicotyledonous plants.

In conclusion, then, it is assumed that the metamorphosis of vessels is confined to these points:—

1. To the enlargement of the cells of which they are composed, which finally assume 90 times their original length, and 12 times their original width.

2. To the change of the membrane, which is at first tender and homogeneous, and finally becomes covered with pores; this change occurring sooner in the smaller vessels than in the large, where, moreover, it continues to present a transitory organization under the form of a spiral band.

3. To the multiplication of the great vessels, which takes place from 8 to 12 by the division of some of them, which division is effected by the formation of longitudinal dissepiments, dividing them into two or more parts.

The formation of vessels in general can then be reduced to the following points:—

1. The cell of the vessel at first appears under the form of a cell, with very delicate walls, the membrane composing which is perfectly homogeneous, and has not the least trace of striæ or any fibrous tissue.

2. Upon the interior of this delicate membrane there is sooner or later deposited, in the form of superimposed rings of spiral fibres or reticulated lamellæ, a second layer of analogous or identical composition, or indeed the fibrous tissue, in consequence of the subsequent deposit of similar material, passes from the spiral to the reticular form. Simultaneously with this internal deposit, a formation of similar layers on the external surface occurs from the thickening of the walls of the contiguous elementary organs, and which determines the disposition of the perforated places.

Finally, the secondary membrane does not begin to be formed until the cell of the vessel has nearly reached its full development.

Payen on the occurrence of Crystalline Deposits in the Tissues of Vegetables.—A short notice relative to Payen's observations on the occurrence of crystalline deposits in the tissues of vegetables was given in our first volume; but as the subject is one of considerable interest, especially with reference to the mode of secretion of inorganic crystallizable matters in living bodies; and as the facts observed by Payen relative to the manner in which this secretion occurs in vegetables, appear to bear some analogy to those which have lately attracted attention with respect to the secretion of salts and other inorganic matters, by the mucous membranes of animals, we have thought it would not be uninteresting to give a more complete abstract of the results of Payen's observations, taken from a report upon his memoir, by M. Mirbel, in the *Annales des Sciences Naturelles*, December 1841.

Previously to Payen, M. Meyen had observed, under the epidermis of various species of fig, masses of crystallized mineral substances, suspended by a cellular cord in the interior of large utricles; but Meyen was deceived in some respects in what he saw. He conceived that the crystallized mass contained a thick kernel of gum, and that the crystals of mineral matter enveloped this kernel, an error which he would not

perhaps have committed, had he invoked the aid of chemistry. M. Payen, however, has succeeded in determining the nature of the crystallized substances, their position, and the mode of their formation, not only in the genus *Ficus*, but in other *Urticaceæ*, and in many other plants of different families. These productions are not formed simply of a crystallized mineral substance, but contain besides an organic tissue which secretes the mineral matter in solution, and becomes the matrix in which this matter is afterwards crystallized. It is consequently evident, that the apparatus must exist before the crystals are apparent. This apparatus, placed in the centre of a large utricule, is composed of two parts, distinct in their structure and function. The one is composed of a tissue in all respects similar to that surrounding it, and constitutes a cellular cord, attached by its superior extremity to the inner surface of the epidermic layers. The other part is a delicate tissue of cells, so minute that they appear scarcely more than points, and so numerous, that by their aggregation they form a mass of considerable size, suspended like a chandelier, at the end of the cord, in the cavity of the large utricule. The progress of vegetation produces no appreciable modification in the cord itself; but this is not the case with regard to the delicate tissue which secretes the carbonate of lime. The vacuities of this organ, become gradually filled with a solution of the salt, which soon crystallizes; and there are now apparent on the exterior cellular layer, the minute mamillary projections, sometimes angular, which Meyen, in his ignorance of the presence of the delicate cellular tissue, mistook for an envelope of bare crystals, deposited on the surface of the central gummy mass which he supposed to exist. The above description applies to many species of the *Urticaceæ*; but it must be remarked, that the same arrangement is not found in all the plants in which crystals have been observed. Those, for instance, of the *Cannabis sativa* and of the *Broussonetia papyrifera*, are suspended from the inner wall of the utricules composing the hairs of these two *Urticaceæ*.

M. Payen has described and figured the incrustations of carbonate of lime, which are met with in the stalk of *Chara*. He describes them as lodged in a superficial cellular tissue, containing much azote, and which envelopes the tubular utricules, disposed in a circular series, around the great central cavities.

The very different forms assumed by the crystals of oxalate of lime, and the position which they take in a great number of stalks and leaves, merit particular attention. This salt has been found in small agglomerations of acicular crystals, radiating from a common centre in the parenchyma, and around the nervures of the leaves of many plants. It occurs in rhombic crystals of a certain size in the parenchyma, of the leaves and under the epidermis of *Citrus*, of *Limonia*, and of *Juglans regia*, and in still larger masses in the *Cacti*; and M. Payen remarks, that there is a great analogy in the forms of crystals in the more allied species, citing as examples of this, *Opuntia*, *Echinocactus*, *Cereus*, *Cactus*, and *Rhipsalis*.

Every phytologist has observed the minute needle-shaped crystals named Raphides. They are so slender, that under a magnifying power of 300 diameter, they present to the eye of the observer merely

linear traces. The delicate experiments of M. Payen, aided by microscopic observation, have proved that the oxalate of lime, of which these acicular crystals are composed, is lodged in very minute cells, joined end to end in a linear series; and, consequently, that when the salt is dissolved, the membranous sheath which contained it becomes a flexible filament.

From this it is evident, that under the influence of the vegetable organism, the same crystallizable matter, oxalate of lime, may assume forms of great diversity, by the varied arrangement of its integrant molecules. M. Payen has, by incineration of the organ secreting the oxalate of lime, obtained a result no less remarkable than the above: he found that the cells which form the matrix, when destroyed by combustion, left on the plates of glass a silicious skeleton, which, under the microscope, was seen to retain the form of the organic tissue. Fragments of the stalks of *Gramineæ*, of *Equisetaceæ*, of *Cactus*, and of various leaves, petals, and grains of pollen, subjected to washing with acid, and to incineration, presented the same phenomena; delicate traces of silica reproducing the minutest details of the organization.

M. Payen, from these and similar researches, deduces the following law:—

“That mineral substances contained in vegetables, even when they assume polyhedric crystalline forms, are not isolated or scattered at hazard, but are always deposited in the cells of an organic tissue, which determines and limits their agglomeration.”

Ehrenberg on the Paper-like Substance from Silesia.—At the meeting of the Berlin Academy, 24th June, 1841, “M. Ehrenberg read a report upon the paper-like substance from Silesia, of 1736, which had been sent by Prof. Göppert from Breslaw.”

The Academy had commissioned the author, on the 4th of March, to report upon this substance which had been sent to it for examination by M. Göppert.

Since the microscopical analysis of the meteoric paper which fell in Courland in 1686 in a snow storm, and which was found to consist merely of a paper-like web of terrestrial *Confervæ* and Infusoria, it has appeared advisable to the author to institute a comparison between this and other similar and purely terrestrial phenomena which have been authentically recorded.

A similar appearance was especially that of the formation of a paper and a kind of wadding, which was left upon the surface of low-lying meadows and fields in Silesia, upon the subsidence of a great flood of the Oder, which lasted all the summer, and broke down the dykes in more than sixteen places. This caused so much distress in the country, by its preventing the growth of the later grass, that it excited great attention; and it was thought fit to send some of the paper-like substance to Vienna for the inspection of the Emperor.

This account is given by Dr. Kundmann, who then lived in Breslaw, in a work entitled, “*Rariora Naturæ et Artis*,” &c.—P. 556.

The occurrence in later years, of similar formations near Sabor and Freiberg, has also excited considerable attention, and these substances have been exhibited to the Academy.

In order to determine how far this meteoric paper may have been brought, by perhaps some hurricane, before it fell in Courland, and whether it may not have been brought from a very distant part of the earth, the reporter, in his account of it, desired that the old collections in Breslaw might be searched for larger masses of the substance, in order to ascertain whether flowers or seeds of some known plants might not be interwoven with these leaves, which is said to have been the case originally, from which the true origin of this substance might with certainty be ascertained.

Prof. Göppert, correspondent of the Academy, has undertaken this scientific task, and has hitherto been unable to find in Breslaw any more of the paper of 1686; but he has discovered in the library of St. Bernhardin, two large pieces of natural paper, from which he surmises that they originated in the misfortune of 1736. This mass, which is composed of interwoven *Confervæ* and grass leaves, is about 34 feet long, and from 2 to 3 feet wide; on one side smooth and of a brownish ash-grey colour, and on the other of a greenish red-brown. This latter side is loosely interwoven with grass leaves, and has entangled in it small shells of the genus *Planorbis*, and other remains of minute aquatic animalculæ. The grey side is more compact, like grey blotting-paper, and contains small grass leaves. The grey smooth side is clearly the upper, and is somewhat bleached by exposure to the rays of the sun. The looser, green side is the under one, which had been in contact with the grass of the meadow.—(For the microscopical analysis of this substance, see p. 59, Vol. II. of this Journal.)

Werneck's Microscopical Observations and Descriptions of New Genera of Infusoria.—At the sitting of the Berlin Academy, Nov. 25th, 1841, M. Ehrenberg presented to the Academy, by desire of Dr. Werneck of Salzburg, an extensive series of new microscopical observations upon descriptions of Infusoria.

These observations first allude to the little that has been done, for the last eleven years, in the advancement of our knowledge of the true anatomy of these beings. They are considered by M. Ehrenberg to be extremely accurate and important; and at the end of the account is given a list of some new genera of Infusoria of both classes, which we have subjoined:—

I. POLYGASTRICA.

I. CALIA.—Nestermonade.

Char. Gen.—Monades gelatina inclusæ (Pandorinæ) plantis aquaticis affixæ, nec liberè natantes.—Duæ species.

II. ERETES. W.—Rudermonade.

Char. Gen.—Phacelomonades loricatæ.—Una species.

III. ANCYRIUM. W.—Ankerfuss.

Char. Gen.—Bodones enterodeli, pede setaceo mobili (Bodo grandis) eique affines.—(6 ?) species.

IV. STEPHANOMA. W.—Kranzkugel.

Char. Gen.—Pandorina, animalculorum serie circulari unica, corpusculis singulis ad Gonii modum dividuis.—Una species. Eximiæ formæ genus.

V. DICELLA. W.—Doppelbart.

Char. Gen.—Bursaria setis duabus immobilibus appendiculata.—Una species.

II. ROTATORIA.

I. MALACOSTOMUM. W.—Weichmund.

Char. Gen.—Notommatae edentulæ.—Tres species.

II. BROCHOCERCA. W.—Schlingenfuss.

Char. Gen.—Monocercæ pede setaceo basi fisso.—Sed hæ formæ a Monocercis satis gravibus notis vix differunt.—Quinque species.

III. RHYNCHOPOGON. W.—Rüsselbart.

Char. Gen.—Diglenæ rostro bilobo insignes.—Duæ species.

Ehrenberg's further results of his Researches into the Berlin Subterraneous Living Microscopic Organisms.—At the sitting of the Berlin Academy, Nov. 11th, 1841, the author made the following communication:—One of the most striking circumstances with regard to the Berlin deposit of Infusoria, part of which are still in the living state, is the fact, that these forms which are thus met with, apparently in a condition to germinate, being filled with green granules, are for the most part not to be found living on the surface in the neighbourhood of Berlin, although they have been sought for with the greatest assiduity.

These species were especially *Gallionella decussata* and *G. granulata*, which are very readily distinguished from all other *Gallionellæ* by their regular, shagreen-like surface, and which occur in vast numbers. Both these species were previously only known to occur as dead shells in the probably tertiary Bergmehl deposit near Kliecken, and in a similar formation in Greece, as also in a deposit lying under peat in North America. With these were many angular silicious spiculæ, similar to those which have hitherto been observed only in marine sponges.

Latterly, from two quarters, some facts illustrative of these enigmatical relations have come to light.

M. Ehrenberg hoped to have been able, in a journey he made in the summer, to the East-sea (Ost-see) in Mecklenburg, to have cleared up this phenomenon, by the finding of similar forms in the sea-water at that locality, or in the brackish water of the marshes; but nothing similar

to them occurred to his observation. But, on the other hand, he unexpectedly obtained the explanation he had hitherto sought in vain, by the assistance of Professor Howeger of Berlin, who furnished him with some mud from the Peene, at Wolgast in Pomerania.

In the Peene, near Wolgast, not far from the sea (Ost-see), and which also is in the district of the Oder, there are found many of the species which are met with living in the Berlin deposit. They are here found on the surface of the river's bottom, and especially the two characteristic *Gallionellæ*, mixed with many various living marine animalculæ. It is thus rendered certain, that these species belong to brackish-water, or at least to river-water, with an admixture of sea-water.

They are not found in the bed of the Elbe near Cuxhaven.

It also appears, from a figure by M. Turpin, in his "Rapport sur une Note de M. Dujardin, sur l'Animalité des Spongilles," in the *Comptes Rendus*, 1838, p. 556, that there is near Paris a species of fresh-water sponge hitherto confounded with *Spongilla lacustris*, which has its silicious spicula furnished with spines, whilst in the northern species none but smooth spicula are met with. Consequently, some of those forms of spicula which have been ascribed to marine sponges, may in reality belong to fresh-water species, whose existence still remains unknown.

The Parisian *Spongilla*, in which M. Dujardin imagines he has observed animal life, is not in fact *Spongilla lacustris*, but should have another name, and for it M. Ehrenberg proposes the name of *Spongilla (Badiaga) Erinaceus*.

Moreover, there are in the Berlin deposit three distinct kinds of spinous spiculæ, none of which altogether resemble M. Turpin's figure, and which are probably all marine.

The report concludes by mentioning the occurrence of a bed of earth containing blue phosphate of iron, mixed with Infusoria, in a part of the great deposit; and, finally, by stating that the geognostic relations of the Infusorial bed are determined with certainty. It rests immediately upon brown coal sand (Braun kohlen sand), and is covered by loam, which has upon it the (Murkischen sand) above both alluvial deposits or mud.

D'Orbigny's List of the Foraminifera of the Chalk of England.—M. Alcide D'Orbigny, in his paper "Sur les Foraminifères de Craie Blanche de Bassin de Paris," published in the "Mémoires de la Société Géologique de France, 1840," enumerates, describes, and figures the following species of *Foraminifera* he has met with in the chalk of England. For the sake of those of our readers interested in this branch of inquiry, we extract the names of the species described by this observer, and append the references to the descriptions and figures, which are to met with in the work above cited:—

1. *Dentalina sulcata*.—D'Orb. p. 15. Pl. I, figs. 10, 11, 12, 13.—Length, 2 to 3 millim.
2. ——— *gracilis*.—D'Orb. p. 14. Pl. I, fig. 5.—Length, 1 and 1½ millim.

3. *Dentalina aculeata*.—D'Orb. p. 13. Pl. I, figs. 2, 3.—Length, $3\frac{1}{4}$ millim.
4. *Marginulina trilobata*.—D'Orb. p. 16. Pl. I, figs. 16, 17.—Length, 2 to 3 millim. (Found only in a young state.)
5. *Cristellaria rotulata*.—D'Orb.—Lenticulites rotulata. Lam. 1804.—Diameter, 2 millim.
6. *Rotalina Voltziana*.—D'Orb. p. 31. Pl. II, figs. 32, 33, 34.—Diameter, $\frac{1}{2}$ millim.
7. ——— *Micheliniana*.—D'Orb. p. 31. Pl. III, figs. 1, 2, 3.
8. ——— *umbilicata*.—D'Orb. p. 32. Pl. III, figs. 4, 5, 6.—Diameter, $\frac{1}{2}$ millim.
9. ——— *crassa*.—D'Orb. p. 32. Pl. III, figs. 7, 8.—Diameter, 1 millim.
10. ——— *Cordieriana*.—D'Orb. p. 33. Pl. III, figs. 9, 10, 11.
11. *Globigerina cretacea*.—D'Orb. p. 34. Pl. III, figs. 12, 13, 14.—Diameter, $\frac{1}{4}$ millim.
12. ——— *elevata*.—D'Orb. p. 34. Pl. III, figs. 15, 16.—Diameter, $\frac{1}{2}$ millim.
13. *Truncatulina Beaumontiana*.—D'Orb. p. 35. Pl. III, figs. 17, 18, 19.—Diameter, $\frac{1}{2}$ millim.
14. *Rosalina Lorneiana*.—D'Orb. p. 36. Pl. III, figs. 20, 21, 22.—Diameter, $\frac{1}{2}$ millim.
15. ——— *Clementiana*.—D'Orb. p. 36. Pl. III, figs. 23, 24, 25.—Diameter, $\frac{1}{3}$ millim.
16. *Bulimina variabilis*.—D'Orb. p. 40. Pl. IV, figs. 9, 10, 11, 12.—Length, 1 millim.
17. ——— *obtusa*.—D'Orb. p. 39. Pl. IV, figs. 3, 6.—Length, $\frac{1}{2}$ millim.
18. ——— *obliqua*.—D'Orb. p. 40. Pl. IV, figs. 7, 8.—Length, 1 millim.
19. ——— *Murchisoniana*.—D'Orb. p. 41. Pl. IV, figs. 15, 16.—Length, $\frac{2}{3}$ millim.
20. *Gaudryina pupoides*.—D'Orb. p. 44. Pl. IV, figs. 22, 23, 24.—1 millim.
21. *Textularia turris*.—D'Orb. p. 46. Pl. IV, figs. 27, 28.—Length, $1\frac{1}{2}$ millim.
22. *Lituola Nautiloidea*. Lam.—D'Orb. p. 29. Pl. II, figs. 28, 29, 30, 31.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

July 20th, 1842.—J. S. Bowerbank, Esq., in the Chair.

At the meeting of this Society a paper was read by Mr. John Quekett, "On the peculiar arrangement of the Blood-vessels in the Air-bladder of Fishes, and on the evidence they afford of the true function of that organ." The author, after alluding to three principal modifications of

the air-bladder in fishes generally, went on to describe that of the cod-fish, which he stated to be a thick muscular bag, without any opening externally, and provided, on its ventrical aspect, with a highly vascular body, which has been supposed to perform the office of secreting the air contained in the bladder. The author described the minute distribution of the vessels in this so-called gland, the capillary system of which was composed of a great number of parallel vessels, aggregated together in bundles, and forming loops at the free surface of the gland; and in the other part of the bladder the arrangement was also remarkable for the parallel manner in which the vessels were disposed in this fish; three, but in others as many as six vessels, ran parallel to each other. The fact of the air-bladder being subservient to the function of respiration, was supported to a certain extent, by the distribution found in the anterior compartment of the air-bladder of the eel. In this fish the vascular net-work approached more nearly that of the cellular lungs of the Batrachia than any other class of vessels. The author concluded by stating, that the probable use of the gland in the closed air-bladders might be not that of secreting air, but of keeping in a pure state the air already there, as those fish provided with a gland generally live in deep water, and from having no outlet to the bladder, are unable to change the contents, should they become impure. The paper was accompanied with injected specimens, and with diagrams of the most important parts alluded to by the author.

Microscopical Memoranda.

Cantor on the Infusoria met with at the mouth of the Canton river.—From comparison with M. Ehrenberg's great work upon Infusoria, it would appear that most of the forms observed at the island of Lantao, situated at the mouth of the Canton river, and at Chusan, also inhabit Europe. The new forms added, as "dubia," are those to which Dr. C. has found none corresponding among Ehrenberg's. To G. W. Grant, Esq., an indefatigable microscopical observer, who kindly examined the sketches and notes made by Dr. C. of Chinese animalcules, he is indebted for the following list of forms described by M. Ehrenberg, which Mr. Grant has recognized as also occurring in fresh water in and near Calcutta:—

Sphaerosira volvox.

Closterium turgidum.

Euglena longicauda.

Epipyxis utriculus?

Arcelina aculeata.

Arthrodesmus quadricaudatus.

Micrasterias hexagona.

Navicula fulva.

——— *turgida.*

Vorticella patellina.

Coleps hirtus.

Lepadella emarginata.

Brachionus urceolaris.

From what has been stated, it will appear, that Indian forms (to which may be added a few Javanese), prevail in the fauna of Chusan, and that European forms make but a secondary feature.—*Annals of Natural History*, July, 1842, p. 361.

Hassall on Showers of Pollen.—The American Journal of Science and Arts for January, 1842, (p. 195), contains some interesting remarks relative to two showers of pollen, one of which fell at Troy, New York, the other in the harbour of Picton, a portion alighting upon a vessel in the harbour on a serene night in June, and having to be collected and thrown over by the bucket-full in the morning. A small quantity of each of these powders was preserved and sent to Prof. J. W. Bailey, to submit to microscopic examination. This gentleman ascertained, that the powder which fell at Picton was wholly composed of the pollen of a species of pine, and that from Troy was made up of pollen from various trees; but Prof. Bailey was not able to state positively what plants furnished it. Figures of the three forms of pollen granules met with in the powder from Troy, accompany Prof. Bailey's letter. From an examination of these, I find that two of them are to be referred to some Endogenous plant, one of them most probably to a species of grass, the other perhaps to the genus *Nymphaea*, and that the third form is undoubtedly the pollen of an Exogen, not unlikely to be the *Corylus*. Prof. Bailey thinks, that no part of the powder can be sporules of *Lycopodium*; because, he remarks, our species of that genus do not flower until July or August, whereas the powder in question fell in May. I arrive at the same conclusion, but for a different reason; the sporules of *Lycopodium* do not present at all the structure of any one of the three figures.—*Ann. Nat. Hist. June, 1842, p. 353.*

Phillips on the Microscopic Structure of Coal.—A paper was read before the Geological Section of the British Association, in which Mr. Phillips observed, that there was no difference of opinion as to the vegetable origin of coal, but only as regarded the circumstances under which those vegetable masses were accumulated. In order to determine this, several modes of investigation might be followed, one of which was, to examine the coal itself, in order to ascertain the nature of the plants of which it is composed. In the microscopic examination of polished slices of coal, by means of transmitted light, some results had been obtained by Mr. Hutton of Newcastle; these observations had not been published, but he believed Mr. Hutton had detected a cellular structure in the substance of the Northumberland coal, which at first sight might be imagined vegetable cells. These cells had been supposed to contain much, if not all the gas of the coal; and in this respect the Northumberland coal differed from the anthracitic, in which the cells were empty. It had been his intention to employ some of the ingenious processes recommended by Mr. Reeve, who had discovered the means of making fossil vegetable tissue apparent to the senses by a process of combustion; but having lately observed something remarkable in the combustion of Staffordshire coal, he was induced to examine it microscopically, without waiting to adopt any more refined process. He observed that the ashes of wood and peat differed in appearance and structure; and this Staffordshire coal, which did not cake, but burned to a white ash, resembled in its combustion the laminated peat of the north of England, or the compact black peat of Dartmoor. Upon examining these ashes, he found abundant traces of vegetable structure, consisting of small por-

tions of woody tissue imbedded in other tissue, apparently of plants much lower in their organization. He had also detected traces of structure in the ashes of anthracitic coal received from Sir H. De la Beche. Mr. Phillips considered this evidence rather in favour of the view that coal was in a great measure formed by plants growing on the spot, and not by drifting; the evidence of such drifting was formerly much stronger impressed upon his mind; but he had met with many phenomena, and this amongst them, which tended very much to diminish the force of his former conclusions.—*Athenæum*, July 16th, 1842.

Hassall on the Growth of the Confervæ.—The rapidity of the growth of most species of *Confervæ*, has been a subject of surprise to many observers of nature, and the explanation which I am about to offer of the causes of this very rapid growth, has not, that I am aware of, been before noticed. Most, if not all, the *Confervæ* appear to me to increase in two ways: first, by the continued growth of the free extremities of the different filaments; this method is obvious, and need not be insisted on. Secondly, by the repeated growth and subdivision of each cell entering into the formation of the filaments. I long suspected the existence of this mode of development, but was first convinced of its reality by an examination of those species of the genus *Conjugata* of Vaucher, distinguished by the presence of spiral tubes winding round the interior of the cells, and especially of the one named *Conjugata princeps*. If the filaments of this species be carefully examined and contrasted together, it will be seen, that in some the length of the cells only just exceeds their diameter, and that each cell contains three spiral tubes, which together perform from seven to eight turns in each, the coils almost touching each other; that in others the length of the cells is more than three times the diameter, but that still each cell contains only the same number of spiral turns, viz. seven or eight, which now, instead of being nearly in opposition, are widely separated, thus plainly proving the elongated cells to be derived from the growth of the shortest ones. And again, it will be noticed in others, that the cells have returned to their original length, but that each now contains only three or four spiral turns, thus manifestly proving the division of the elongated cell, and completing the chain of evidence which establishes to demonstration the existence of the mode of growth to which I have referred in the section of the genus alluded to. The number of spiral tubes varies in this and other species in different filaments, but not in the same: and this makes a corresponding difference in the length of the joints or cells, which are longer if there be four or five tubes instead of three. The proofs now to be adduced, that this mode of growth likewise takes place in all *Confervæ* which are composed of simple unbranched filaments, a large class, are little less conclusive than those first commenced. In most of the filaments of these, the cells will be observed to be of various lengths, some twice as long as others, and these again of very intermediate length. Now, by means of this law of growth, this variation in the length of the cells is at once and satisfactorily accounted for, which is not to be done in any other way. But this is not all: the progress of the formation of the septa which divide

the cells, may be frequently traced either in the same or different filaments, which is alone sufficient to establish the reality of the existence of this law of increase in this numerous section of the class *Confervæ*. The only *Confervæ* to which I should for a moment hesitate to apply this method of development, and I believe that it is applicable to them likewise, are the branched species, to which such a means of increase is less necessary, seeing that, unlike those with simple unbranched filaments, they have innumerable terminal points of growth. Now I beg to lay particular stress on this law of development, which is evidently very important, inasmuch as it not merely goes to account for the rapid growth of many species of *Confervæ*; for it is simultaneously in operation in each of the many hundred cells of which each filament of most *Confervæ* is composed; but it likewise teaches us that much caution is requisite in determining species, as it proves that the character most relied on for this purpose, is one subject to very great variation; that is, the length of the joints. There is a limit, however, to this law of development, which does not, in the section of the genus *Conjugata*, to which reference has been made, allow of more than one or two divisions of each cell, unless, indeed, the spiral tubes grow likewise in an equal ratio, which may be the case, and then the division of the cells may be frequently repeated. In those *Confervæ* which do not contain spiral tubes, the multiplication of the cells may go on to an almost endless extent. To illustrate the importance of attention to this law of development in determining species, I may observe, but for this timely discovery, I should have described several species of *Conjugata* as distinct, which are really not so, considering the length of the cells and number of spiral tubes in the interior of each cell to be the most decided characters whereon to found specific differences. They are not so, however, one of the most certain being the diameter of the filaments. But, carrying this law in view, it is not difficult to estimate the extent of variations in length to which the cells are subject, first as ascertaining what the primary length of the cell is. In the branched *Confervæ*, there are laws of development, some of them peculiar to each species, presiding over the arrangement of the branches and cells, which have hitherto escaped the scrutiny of man.—*Proc. Dublin Nat. Hist. Soc.*, June 1st, 1842, quoted in *Ann. Nat. Hist.*, July, 1842, p. 431.

Griffith's Observations on Santalum, Osyris, and Isoetis.—In *Santalum* the ovulum consists of a nucleus and an embryo-sac, prolonged both beyond the apex and the base of the nucleus; the albumen and embryo are developed in the exerted part above the septum; the mass of the embryo is developed directly from the vesicle, which is the termination of a pollen tube; the seed (albumen) has no other proper covering than the incorporated upper separable part of the embryo-sac.

In *Osyris* the ovulum is reduced to a nucleus and an embryonary sac, prolonged exactly in the same directions as in *Santalum*, but not to such a degree anteriorly; this anterior portion resembling exactly the unchanged part of the sac of *Santalum* below the septum. The albumen and embryo are formed outside the sac, and are absolutely naked, or whatever covering they may have, did not enter into the composition of the ovulum.

Mr. Griffith adds, I have lately looked at *Isoetes capsularis*, Roxb.; it is an instructive plant, for it shows that botanists are mistaken in their supposition as to the male. In Roxburgh's plant the contents of the sporangium are sometimes of two sorts, but both have the same origin, both are precisely similarly constituted, except perhaps as to contents; and the largest of these, the males of authors, become afterwards like the others, but larger. There can be no doubt that in all these plants the true sporules or seeds are thus produced by division of an original simple cell or its contents. *Isoetes* and *Azolla* prove, too, a thing of some importance, that the dissimilar organs which have so puzzled botanists may have a similar origin. The true male of *Isoetes* will probably turn out to be the oblong, cordate, fleshy laminae above the female. On the male my observations were stopped by indisposition. As a male it is certainly anomalous; it is probably, I conjecture, developed originally within the leaf, and the scale between it and the female is probably analogous to the indusium of ferns. The most instructive plant is *Anthoceros* (which is not a *Hepatica*), for this may explain Ferns, by showing that a pre-existing organ, to be acted upon by the male influence, is not necessary. Endlicher says *Isoetes* has no stomata; De Candolle figures them in his "Organographie;" in *I. capsularis* they are very evident: no matter whether emerged or submerged, all plants having a cutis have stomata.—*Proc. Linnean Society, Dec., 21st, 1841.*

Valentine's Supplementary Observations on the Development of the Theca, and on the Sexes of Mosses.—The author commences his letter by stating, that subsequent observations have induced him to concur entirely with the views of Professor Mohl as to the sporules of Mosses being developed by four in a mother cell, a fact which he was led to doubt in his former communication, printed in the 17th volume of the Society's Transactions. The present paper contains a detailed account of the development of the theca in *Edipodium Griffithianum*, which exhibits a beautiful example of the tetrahedral union of the sporules. In this moss the four sporules in each mother cell are piled on each other so as to form a cone with a triangular base, and they appear to be connected with each other in the young state by a very minute stalk which is situated at the conjunction of three radiating lines. This connexion is perhaps in most instances dissolved at an early period, and the sporules recede a little from each other, but are still kept in the triangular form by the mother cell. It is not uncommon, however, to find the connexion unbroken after the sporules have arrived at maturity, and in these instances there seems to be a general adhesion at the opposing faces of the sporules.

The author concludes his paper with some remarks on the analogy that exist between sporules and pollen, which, he observes, is so remarkable, and the particulars so numerous, that the essential identity of the two can be scarcely a matter of opinion.—*Proc. Linn. Soc., 1839.*

Dissecting Instruments to use with the Microscope.—A small scalpel with a thin and narrow blade, whose edge is curved backwards, and two common needles, very sharp, and fitted into handles like that of the scalpel, are all the instruments required for the microscopic dissection of organs. The scalpel is used for dividing, and the needles for separating and clearing the parts, and for bringing them into contact with the re-agent employed, or into the field of the microscope. A few small hooks may also be provided, attached to threads having a small leaden weight at the end, for the purpose of stretching membranes which are submitted to observation. When the object under examination is immersed in an acid, small wires of platina are used in place of needles.

Dropping Tubes.—These are glass tubes drawn out to a capillary opening at one end by the lamp; and they are used for placing on the object-holder a drop of the re-agent whose action is to be examined, and which has been introduced through the same end by sucking. They may be prepared very easily by heating the middle of a piece of glass tube till it be softened sufficiently to be bent, and after it is cold, applying the flame of the lamp to one of the branches at a short distance from the bend. When it is quite red hot, laying hold of the two ends, they are to be drawn asunder, when the softened part will be drawn out till it becomes capillary; and if broken off at a convenient length, it will be found pervious.—*Raspail's Organic Chemistry.*

Harrison on Transverse Striæ on Navicula Hippocampus.—In our last number we noticed the existence of distinct *longitudinal* striæ on this species of Navicula. Our attention has since been directed to *transverse* striæ on the same species by Mr. Harrison of Hull. We can with him testify their presence, after some considerable patience and manipulation as regards the modification of the light. They are more evident in the single shell, not mounted in Canada balsam, than in the slide in which they are set up in that menstruum.

Grimelli on the Vascular Structure of the Iris.—In the *Annali Universali*, 1841, M. Grimelli has published an article on the structure of the iris. By injections of coloured oils thrown into the carotids, he has been able to inject the interior of the eye, and all the vessels of the iris. During his injection he has seen the iris swell, and from his observations on the direction and form of these vessels, he believes that that membrane is of a vascular, and not of a muscular structure.—*Lond. and Edin. Month. Jour. Med. Science*, Jan. 1842, p. 58.

[If we mistake not, the late Sir Astley Cooper demonstrated this fact some years since; the specimens are, we believe, still to be seen in the Museum left by that distinguished anatomist.]

Busk on the Hairs of Animals.—The references to the figures in Plate 2, will be given in the continuation of Mr. Busk's paper "On the Structure of Hairs and other Cuticular Appendages in various classes of Animals.—No. 2, page 225.

XXXIII. — ON THE STRUCTURE OF HAIRS AND OTHER CUTICULAR APPENDAGES IN VARIOUS CLASSES OF ANIMALS.—No. 2.

*By George Busk, Esq., Surgeon to the Hospital Ship,
Dreadnought, &c.*

THE hairs figured in Plate 2. accompanying the present number of the Journal, are those belonging to animals in the following classes of Mammalia :—

I. RODENTIA.

Rabbit—figs. 5, 7, 15, 24.

Rat—figs. 14, 18.

Musquash (*Mus. Zibeth. Gm.*)—figs. 13, 22, 23.

Hare—fig. 10.

II. CARNIVORA.

1. *Digitigrada.*

a. Viverrine.

Ermine (*Putorius. Cuv.*)—figs. 1, 2, 12.

Stoat or Fitch (*Putorius ? Cuv.*)—figs. 4, 6, 9.

Sable (*Mustela. Zibell.*)—figs. 3, 21.

b. Feline.

Cat—fig. 17, 20.

Ocelot (*F. Pardalis*)—fig. 11.

Tiger (*F. Tigris*)—fig. 16.

c. Canine.

Dog (*Canis Fam.*)—fig. 19.

2. *Insectivora.*

Mole (*Talpa*)—fig. 8.

The hairs of the Rodents here figured, farther corroborate what was advanced in the former notice on this subject (p. 33), namely, that in this class the hairs are furnished in the interior, with distinct, regular, colour cells, in which only, is the colouring matter of the hair deposited. In fig. 15, the white hair of a rabbit, the cells will be observed to be quite empty; and in fig. 24, which is taken from a hair partly black and partly white, some of the cells are empty, while others are more or less filled with black matter.

In the smaller hairs of the animals belonging to the feline tribe, nearly the same regularity of formation and disposition of cells in the interior is observable ; but this regularity is not preserved in the larger ones, as it is for the most part in those of the *Rodents*. Indeed, the cells appear to become obliterated in most of the larger hairs, as in fig. 16. The cells, also, in this tribe, as in the *Canine*, assume more or less of an angular form, and do not appear to be exclusively the seat of the colour, as in the former class. Whether, in fact, the cells in these hairs do really contain colouring matter, I have not positively ascertained. In the smaller hairs of the *Viverrine* tribe, the same regularity of form and arrangement of cells obtain ; they are, however, usually empty, and in the larger hairs, they coalesce into an irregular cellular texture, as in figs. 4, 9, 13, 22 ; but in the sable, one of this tribe, they retain a more regular arrangement, but still less so than is the case in the larger hairs of *Rodents*. In this tribe, also, the whole of the colour is not exclusively confined to the cells, but pervades the horny tissue of the hair, as may be seen in the black hair of the tail of the ermine. A striking difference between these hairs of the *Carnivora* above mentioned, which have distinct cells, and in this respect resemble the hairs of *Rodents*, and those of the latter class, exists in the circumstance of the former having the surface covered with regularly imbricated scales, very strongly marked, as seen in figs. 4, 9, 17. In the larger hairs, however, in which also the internal cells are irregular or deficient, the scaliness on the surface no longer retains, in all cases its regularity and distinctness, as in figs. 6, 13, 16, 23.

The hair of the mole, the only insectivorous quadruped I have yet figured, has the distinct, regularly-arranged colour cells of the *Rodent*, but which, even in the larger hairs, are still in a single series, their width increasing in proportion to that of the hair, from side to side of which they always reach, and are not multiplied as in the latter.

The hair of this animal is also peculiarly characterised by the unilateral, toothed appearance, owing to the projection on one side only of the hair of the surface scales.

(To be continued.)

XXXIV.—MICROSCOPICAL OBSERVATIONS ON THE PATHOLOGICAL MORPHOLOGY OF SOME OF THE ANIMAL FLUIDS, BY DAVID GRUBY, M.D.—
No 2.

Translated from the Latin by S. J. Goodfellow, M.D., &c.

[Continued from page 206.]

OF PUS.

I HAVE considered the following questions concerning pus, which are sufficiently trite, indeed, but as yet have not been performed with the penetrating examination which the difficulty of the subject required, in order to ascertain:—

1. What is understood by the name of pus ?
2. If a material difference can be shown between pus from a wound (pathological organ), and pus from the surface of an organ whose continuity is uninjured ?
3. Whether a material difference is to be observed between pus and mucus ?
4. If the product from the commencement of suppuration to the termination of the process be always the same ?
5. What material changes are observed between pus produced from a normal process of suppuration, and that produced from an anomalous process.

Pus secreted by an abscess is a yellow fluid, of an agreeable animal odour, of the consistence of cream ; that from the process of inflammation or irritation is composed of globules three or four times larger than those of the blood, and a fluid. Allowed to rest, a double stratum is perceived, the upper one being very fluid, the lower thicker.

The inferior stratum, submitted to the microscope, is perceived to be endowed with yellowish-white, and perfectly smooth globules, joined together by a viscid fluid. The globules exceed in size three or four times those of the blood ; most of them are round, some are oblong, others wedge-shaped. They consist of a transparent envelope, with usually one, sometimes two, but seldom with no vesicle enclosed in them ; the diameter of the central vesicle scarcely exceeds that of the blood-discs, the remaining space is filled by the small and large primitive molecules.—Plate 6, fig. 97.*

* Gerber thinks that pus-globules secreted from wounds, are nothing more than exudation-globules, which lie beyond the vivifying influence of the surface of the

The coverings exposed for a long time to distilled water, perceptibly swell, and are ultimately broken, the central vesicle, surrounded by the primitive molecules, remaining; but this being deficient, the congregated primitive molecules alone remain.—Plate 6, fig. 97, *m, n*.

Globules exposed for a long time to the air have yellow polygonal margins, which surround a white pellucid space.—Plate 6, fig. 98.

Acetic acid sp. gr. 1,030, renders the globules diaphanous, the coverings sensibly vanish, with from two to five nuclei, which at first were not clearly seen, remaining; the nuclei, which have an amber-yellow colour, are round, and their magnitude is in indirect relation to their number. Hence, when you perceive five nuclei, their diameter scarcely exceeds one-third of that of the blood-globules; but when two only are seen, their diameter exceeds the half of that of the blood-globules.

The nuclei within the margin have a black ring, and within this they show another black ring, enclosing a central lucid spot.—Plate 6, fig. 99.

The nuclei swim together in a certain symmetrical order in the surrounding fluid, which being evaporated, they disappear, and nothing except the rudiments of the envelopes, previously softened in acetic acid, again comes into view; they bear an irregular angular or spherical figure, with a very thin black or punctated margin, showing in their centre a white pellucid spot surrounded by extremely fine points.—Plate 6, fig. 100, *a* and *b*.

Oxalic acid produces the same change as acetic acid.

Tartaric acid quickly produces the same changes.

Solution of caustic potash 1,350, quickly dissolves the globules,

wound, and exposed to the influence of external agencies, and therefore forsaken, as it were, by the organizing principle, begin to degenerate in their organization, and to suffer changes in their chemical constitution, whilst those that continue in immediate contact with the living structures of the body, advance in their organization: those globules that are cast loose then die—*mors vitæ origo*.

“On the exudation-globules that are free, a number of delicate lines, radiating from a centre, are first perceived, which divide their peripheries into from six to eight (seldom more) segments; these lines become more and more distinct, and the capsule appears as if it were torn or cleft, but without separation of parts; in many globules, too, the nucleus now appears inclined to fall into from two to three pieces; the originally reddish-yellow colour of the globules fades, the segments of the envelope and divisions of the nucleus, which had been linear and sharp in appearance, become rounded off till they appear like aggregated granules, whilst the pus, now completely formed, acquires a greenish-yellow hue.”—*Gerber's Elements of Anatomy, translated by Mr. Gulliver.*

and form a white fluid resembling mucus, which is easily drawn into threads, and when dried, no form is any longer seen.

Caustic ammonia does not change the globules.

Diluted nitric acid 1,170, corrugates the envelopes of the globules, and forms one contracted central nucleus, which is distinctly to be seen. Plate 6, fig. 102.

Diluted hydrochloric acid 1,070, like nitric acid, corrugates the envelopes, and one moderately clear and contracted nucleus is seen.

A solution of nitrate of silver 1,275, renders the coverings transparent, the remaining contracted nucleus being clearly seen.—Plate 6, fig. 103.

In alcohol 0,830, the envelopes of the globules become corrugated, the nucleus, when there is one only, equals twice the diameter of the blood-globules; or when three nuclei are found, they are even five times smaller than the blood-globules.—Plate 6, fig. 101.

The upper stratum is more fluid, is endowed with much fewer globules of pus, and a greater quantity of the white pellucid fluid. The fewer globules it contains the whiter is the colour, and the more of fluid (serum) is contained, the more fluid the stratum is found to be.

In large subcutaneous rheumatic abscesses, the different fasciæ, cellular tissue, and the smaller vessels and nerves, are found infiltrated with pus.

Globules of pus found in the parenchyma of organs, evidently separate its fibrils and fibres one from another and surround them; hence the colour of the parenchyma is changed to yellow, reddish-yellow, brownish-yellow, greenish-yellow, according to the quantity of pus-globules and the colour of the organ in its healthy state; thus, for example, cellular tissue, which is white, when infiltrated by pus, becomes yellowish-white, or from white, greenish-yellow.—Plate 10, fig. 64. The liver, also, when infiltrated with pus, from reddish-brown, becomes yellow; the kidneys, from red, change into a yellow colour. By this infiltration, the texture of organs loses much of its cohesion and tenacity, the organs are consequently rendered friable and soft, until the number of the globules shall have so increased, that the lacerated fibrils completely dissolve, and, mixed with pus are enclosed by the surrounding texture, which is as yet firm. This state of things is called an abscess. Some of the globules of pus which have been shut up for a long time in an abscess, are composed of an envelope filled with very small molecules, others of the small molecules only.—Plate 10, fig. 61.

But the globules taken from a metastatic abscess, thirty-six hours after death, were destitute of all covering.—Plate 10, fig. 62. Globules taken

from an abscess of the liver thirty-four hours after death, consisted of an envelope filled with the smallest molecules.—Plate 10, fig. 63. Pus from a wound suppurating torpidly for twenty years, with a base furnished with hard and long granulations, was yellowish-white, contained a few globules, and a great quantity of cells of epithelium in different states of evolution.—Plate 9, figs. 54, 55.

Exudated purulent peritoneal fluid of a yellowish-green colour, besides globules of pus with an envelope filled with small and large molecules, contained other globules which were destitute of all covering, and transparent, and of epithelium, beset with larger molecules.—Plate 9, figs. 56, 58; Plate 10, fig. 59.

The yellow flocculi swimming in peritoneal exudation, are composed of coagulated fibrin, enclosing globules of pus.—Plate 10, fig. 60. Recent peritoneal exudation, Plate 9, fig. 56, contains globules whose central vesicle is provided with the smallest molecules.

OF VARIOLA.

1.—*Modified Variola.*

Of the material changes which we find in the products of this pathological process, some take place during the formation of papulæ, or of vesicles, and others during the formation of pustules.

Being preceded by three days of inflammatory fever, the red spots, in about twenty or thirty hours, appear changed into papulæ; and the limpid fluid, in small quantity, which was extracted from the affected epidermis, offered an alkaline re-action; under the microscope, a few larger, white, almost pellucid globules appeared in it, together with animalcules composed of a globose or conoid trunk, very thin neck, which was crowned with a small hook, with which they exercised a continuous motion, by turning the neck forwards and backwards.—Plate 9, fig. 42.

On the *third* day of the eruption, the limpid fluid extricated from the papulæ, contained, besides the molecules, a few pellucid globules, exceeding by two or three times the size of the blood globules, abounding with primitive molecules, which scarcely exercised any molecular motion. The animalcules, at one time curved, at another conoid or cylindri-form, the hook being retracted, sometimes exercise a very quick circular motion.—Plate 8, fig. 31; Plate 9, fig. 43.

The molecules without the globules are of different sizes; the smallest which are visible scarcely exceed the $\frac{1}{20}$ th, the larger $\frac{2}{20}$ — $\frac{4}{20}$ ths, and

the largest $\frac{5}{20}$ — $\frac{10}{20}$ ths of the size of the blood discs. The smallest globules scarcely exceed in size $\frac{10}{20}$ — $\frac{10}{20}$ ths of the blood-globules.—Plate 8, figs. 29, 30.

On the *fourth*, *fifth*, and sometimes on the *sixth* days of the eruption, the limpid fluid which is found in the vesicles in small quantity, presents globules almost pellucid, with large and small molecules, and here and there they are provided with central vesicles.—Plate 8, figs. 31, 35, 36 ; Plate 9, fig. 45. The molecules which fill the globules exercise a powerful motion even with the envelope broken, (the envelopes are not easily broken.) Animalcules and small globules, as above described, also appear.

On the *fourth*, *fifth*, and sometimes on the *sixth* and *seventh* days of the eruption, the fluid contained in the vesicles, has an alkali like the serum of milk. The globules of pus turgid with the larger molecules, are increased in number, and exhibit a yellow colour. Globules destitute of molecules are seldom seen in this fluid, and the molecular motion is very evident. In fat individuals, there is sometimes found in it a globule of fat. In some, large, round, or oval globules are seen, exceeding in size the globules of pus four to six times, endowed with the larger molecules, and of a marked yellow colour. The envelopes of some of the globules of pus are more quickly broken, and conoid and cylindrical animalcules are also seen.—Plate 8, figs. 32, 37.

On the *fifth*, *sixth*, and sometimes on the *seventh*, *eighth*, and *ninth* days of the eruption, the fluid in the pustules becomes thicker, and of a deeper yellow colour, and has scarcely any perceptible alkaline re-action. It contains many yellow globules, the envelopes of which are easily broken. Some of the globules are destitute of all envelopes ; but the more the pustules approach the stage of exsiccation, the more intensely the globules are marked of a yellow colour, and the quicker the envelopes are broken : hence they become irregular, some corrugated by drying ; others, their envelopes being broken, dissolve, and the molecules which they enveloped, I have observed, dispersed without order. The molecular motion at length ceases, and with the fluid may be mixed recent and older cells of epidermis ; this continues until all the fluid which held the globules and molecules suspended in it is evaporated, and inflammation having ceased, is not renewed. Hence a thick pus is continually secreted, until ultimately this becomes dried, turns into a hard crust, which we believe to be made up of a compound of small and large molecules, a few globules of pus, conoid animalcules, and dried cells of epidermis.—Plate 8, figs. 33, 34, 38—41 ; Plate 9, figs. 47—50.

2.—*True Human Variola.*

True human variola seldom occurs among us. I have observed this severe pathological process in one individual only. The pellucid lymph from papulæ, here and there broken, contains, on the *seventh* day of the disease, white globules, not perfectly round, but fimbriated on one side as if torn from the place of their growth, exceeding by four or five times the magnitude of the blood-globules, and which we observed to be provided with a pellucid covering and very small molecules. There are, moreover, formed in this fluid, small white or yellowish globules, and also a few globules of the blood.—Plate 9, fig. 52.

Death, which put an end to the disease on the following day, prevented, to my sorrow, any ulterior investigation.

OF LYMPH AND PLASTIC EXUDATION.

The plastic lymph, an integrant part of the living blood, united to serum and the red particles, constitutes blood. The living blood circulating in the organism, when investigated by the microscope, appears composed of two elements :—

a Of globules ;* and,

b Of a pellucid fluid, in which the globules float ; the liquor sanguinis :—

Fresh blood taken from the circulatory passages, received in a sufficiently deep vessel, and kept at rest for some time at a moderate temperature, coagulates, and its constituent parts separate from each other.

The globules, on account of their great specific weight, fall to the bottom ; but the liquor sanguinis also divides :—

1st. Into plastic lymph (fibrin) which coagulates, and united with the globules forms the clot, but accumulated on the surface without globules, forms the so-called phlogistic, buffy crust ; and,

2dly. Into serum, in which the clot floats.

The globules of the blood are again endowed :—

1st. With an envelope ; and,

2dly. With a nucleus.

* Particles or discs would be the more correct appellation for these corpuscles, since all *recent* microscopical observers agree in opinion that they are not globules ; but, as the author in the original work has given to them the name *globuli*, the Translator, from a wish to deviate as little as possible from the literal translation, has allowed it to remain.

The envelope of the globules is a red substance, soluble in water, from whence the blood takes its red colour, and is called *cruor* (*hæmotosin*) ; but the nucleus is not soluble in water ; it is white, and is called *fibrine*.

The plastic lymph, on account of its lighter specific weight, coagulates, and constitutes the superior part of the clot (namely, the so-called *phlogistic* or *buffy crust*), exhibiting a yellowish-white colour, and is of very firm consistence, tenacious, elastic, and transparent.

The blood coagulating quickly, offers no *phlogistic crust*, for the globules of the blood, on account of the more rapid coagulation of the plastic lymph, are not permitted to fall to the bottom ; hence they become suspended by it, and do not change the place which they occupy. They tinge the clot in every part of a red colour ; hence, on account of the equable distribution of the plastic lymph, the clot preserves an equable tenacity and firmness in every part.

The serum of the blood, extricated from the clot by the coagulation of the plastic lymph, appears of a greenish-white colour, and is a thin and transparent fluid. Blood, quickly coagulating, extricates but little of the serum, because a part of the serum remains shut up in the plastic lymph ; the quicker, therefore, the coagulation of the blood, the smaller the quantity of serum which is extricated ; and, vice versâ, the slower the coagulation, the more of the serum is extricated, (i. e. in blood free from any *dyscrasy*) ; so that the quantity of serum extricated is in direct relation with the quantity of *phlogistic crust* ; for when there is a large *phlogistic crust*, then there is a large quantity of serum, and when there is no crust, then but little or no serum is extricated.

Blood stagnating in the heart and large vessels, life being extinct, separates in the same manner into its constituent parts, viz., into clot and serum, the clot, as in vessels out of the organism, adapting itself to the form of the vessels in which it remains. In the heart and large vessels it forms oblong, globose, cylindrical, or conoid pieces, the superior part of which, of a white colour and gelatinous, constitutes the *phlogistic crust*, composed of plastic lymph ; but the inferior part of the coagulated blood, of a deep black, is composed of the globules of the blood. These coagula are called *polypi* of the heart. The recent plastic lymph of these *polypi*, investigated by the microscope, is composed of soft, very thin, transparent fibrils, running in a straight and parallel direction, and enclosing among them very small molecules.—Plate 10, fig. 65.

The plastic flocculent exudation of purulent puerperal peritonitis, is composed of plastic lymph and globules of pus.—Plate 10, fig. 60.

The yellowish gelatinous plastic exudation produced from recent peri-

carditis, is composed of transparent, very thin fibrils, running parallel, or for the most joined into fasciculi, and also of the smallest molecules and globules, exceeding by twice or thrice the diameter of those of the blood.—Plate 10, fig. 67.

The hard, plastic, greenish-yellow exudation from the mucous surface of the uterus, is also composed of soft, parallel fibrils, intermixed with numerous molecules, and the globules of pus are seen equally distributed among the fibrils.—Plate 10, fig. 66.

The plastic yellowish-white exudation formed on the external surface of the heart for three or four days (the villous heart), consists of soft, gelatinous fibrils, united into fasciculi, and running in a parallel direction, which enclose within themselves a few white transparent globules, exceeding by twice or three times the diameter of those of the blood, and filled by the smallest molecules.—Plate 10, figs. 68, 69.

The white, somewhat rough, plastic exudation of the villous heart, formed from the *sixth* to the *eighth* days, is composed of roughish, single fibres, running flexuously.—Plate 10, fig. 70.

The hard, white plastic exudation of the villous heart, formed from the *fourteenth* to the *twenty-eighth* day, is endowed with hard fibres, forming oblong and round areolæ.—Plate 10, fig. 71.

OF THE WHITE PELLUCID FLUID SEROUS EXUDATION.

The limpid serous fluid of a bladder, formed by the application of a blistering plaster, investigated by the microscope, consists of two constituent parts, viz., a perfectly fluid part, and a few white globules floating in it. These globules are diaphanous, and scarcely exceed twice the diameter of those of the blood. They are invested with a very fine, smooth envelope, which includes the smallest molecules. Here and there, also, globules occur destitute of all covering, and endowed with naked, very small molecules.—Plate 10, fig. 78.

The limpid serous fluid received from the papulæ of modified variola, contains, besides the larger globules, others in no respect different from those of the serum.—Plate 8, fig. 29,

The limpid serous fluid extricated from recent infiltration of intestine of abdominal typhus, contains the same globules of serum.—Plate 10, fig. 77.

The limpid serous fluid filling the interstices of the fibrils of the plastic exudation of the villous heart, contains globules not differing from those of the serum.—Plate 10, figs. 67, 69.

The white pellucid fluid of a serous cyst (*morsus diaboli*) contains white, perfectly round, smooth globules, destitute of all covering, smaller, or a little larger than the globules of the blood.—Plate 10, fig. 81.

The white pellucid serous fluid, with which the skin is rendered turgid in œdema, contains white or yellowish globules with stellate points.—Plate 10, fig. 79.

OF THE ULCERS AND TUMID MESENTERIC GLANDS OF ABDOMINAL TYPHUS.

(*Of Ileo-Typhus—Ulcerous Ileitis—Gastro-enteric Fever, inclining to Nervous—Gastro-enteritis—Nervous Inflammatory Fever—Versatile Nervous—Nervous Fever with Stupor.*)

Abdominal typhus, that multiform disease, designated by so many names by the most celebrated authors, has as many forms. In this place we shall speak of the pathological mutations of the substance and texture of the inferior part of the ileum; also of mesenteric glands adjacent to this, and of the changes in the spleen.

In bodies examined on the *fifth* day of the disease, besides a turgid state of the membranes of the ileum, there is seldom any kind of disease to be seen.

Those who die on the *tenth* day, besides a turgid state of this membrane of the ileum, show roughish, somewhat elevated lenticular or oblong patches, the extent of which exceeds one or two inches, called crude infiltrations by the most celebrated anatomists. The mucous membrane covering the *lenticular* infiltrations, *slightly* adheres to them, and is easily removed from the part, and thrown into folds; but the mucous membrane lying over the *oblong* infiltrations, adheres *firmly* to them.

The muscular coat is intimately joined to all the crude infiltrations.

The infiltrations thrust forward the mucous membrane, whose surface is equal and smooth, whilst they are lenticular; but when it covers the oblong patches, it is uneven and furnished with many small elevations and depressions. The places which the oblong patches occupy, correspond to the seat of the glands of Peyer.

The texture of the infiltrated patches is firm, tenacious, white, or yellowish-white, and a white, limpid, serous fluid is extricated by pressure, which, investigated by the microscope, contains white globules, composed of a smooth covering filled with the smallest molecules. The

globules are round or oblong, and exceed the diameter of the blood-globules once or twice.—Plate 10, fig. 77.

The ileum of patients dying on the *fifteenth* day of the disease, offers infiltrated patches, covered here and there near the valve of Bauhinus, with hard brittle greenish, or greyish-yellow, or brownish crusts, the thickness of the crusts increases to half a line and beyond; but the thickness of the infiltrations from half a line to almost two lines.

The crusts investigated by the microscope are composed of a substance irregularly granulated. They adhere at first firmly to the infiltrated patches; but somewhat later they adhere slightly, and are easily separated from them.

The slightly adherent crust, being removed, leaves an ulcerous infiltrated patch, whose margins are hard and elevated, but whose bottom is uneven, hard, slightly excavated, and covered with a very little fluid of a greyish colour.

Under the microscope, round white globules are found in the fluid, of which some are composed of a smooth envelope, enclosing the smallest molecules, others of the smallest molecules only. Their diameter exceeds twice or four times that of the blood-discs.—Plate 10, fig. 72.

The infiltrated substance taken from the margins of the ulcer, offers, under the microscope, conoid or elongated corpuscles, mostly in the broader part, enclosing a central vesicle, their narrower part is prolonged into a thin fibril; intermixed among these, white, transparent, round globules appear, four or six times larger than those of the blood, and filled with the very smallest molecules.—Plate 10, fig. 73.

The infiltrated substance taken from the bottom of the ulcer, contains the same microscopic forms,—Plate 10, fig. 74, (depicted close together.)

The intestines, investigated on the *twentieth* day of the disease, exhibit few entire, infiltrated patches, but many ulcers, partly covered with crusts, partly clean excavations already freed from the crusts, the margins and the bottom being somewhat rough.

On the *twenty-fifth* day of the disease, the margins are somewhat elevated, the bottom of the ulcers appear but little rough, and here and there a crust is still found.

Those who die on the *thirtieth* day, exhibit ulcers with the bottom somewhat depressed, thin smooth margins; here and there fibres of muscular membrane appear in the fundus; in some the bottom is closed by the peritonæal membrane; in others it is perforated, and

a free passage given to the contents of the alimentary tube into the peritoneal sac.

On the *fortieth* day of the disease, generally no more ulcers are to be detected; in their place, small smooth depressions of mucous membrane are found, provided with no intestinal villi and no follicles; the peritonæal serous membrane investing this small part, is remarked of a livid colour. The intermediate net-work, covering the depressed patch of mucous membrane forms oblong and angular areolæ.

On the *sixtieth* day the depressions of mucous membrane are furnished with elongated cylindrical villi, distant from each other, and also with a few simple and shallow follicles.

The net-work of intermediate vessels forms angular, round, or oval areolæ.

Those mesenteric glands, which lie next the ulcers, most often swell; they grow red or livid, are rendered softer or more fluid; the degree and extension of the pathological changes in the glands being seldom found in indirect relation with the changes in the intestine.

The fluid extricated from the tumid, red, and livid glands, and examined by the microscope, is greyish-white; it contains, besides some globules of blood, a good many round, white globules, exceeding in extent from three to six times the blood-discs, with a smooth envelope full of the very small molecules. Globules are here found, furnished with one or more central vesicles.—Plate 10, figs. 75, 76.

The changes of the spleen in abdominal typhus, respecting its increase of volume; of absolute and specific weight; change of density, and colour; I shall leave to be treated of in another place; here it will be proper to note, that globules occur in the inflamed (hepatized) substance of the spleen endowed with the smaller molecules, which are seldom provided with a smooth envelope, and elongated white corpuscles, the representation or form of which the reader will find in Plate 10, fig. 62.

(*To be continued.*)

XXXV.—OBSERVATIONS ON FIBRE.*

By Martin Barry, M.D., F.R.S., L. and E.

THE author observes, that in the mature blood-corpuscles, there is often seen a flat filament already formed within the corpuscle.

* Extracted from the Annals of Natural History, in the Lond. and Edinb. Journal of Medical Science. In our next number, we intend offering some remarks with reference to this interesting subject.

In mammalia, including man, this filament is frequently annular; sometimes the ring is divided at a certain part, and sometimes one extremity overlaps the other. This is still more the case in birds, amphibia, and fishes, in which the filament is of such length as to constitute a coil. This filament is formed of the discs contained within the blood-corpuscle. In mammals, the discs entering into its formation are so few as to form a single ring; and hence the biconcave form of the corpuscle in this class, and the frequently annular form of the filament it produces. In the other vertebrata, the discs contained within the blood-corpuscles are too numerous for a single ring; and they consequently form a coil. At the outer part of this coil, the filament, already stated to be flat, often presents its edge; whence there arises a greater thickness of the corpuscle, and an appearance of being cut off abruptly at this part; while in the centre there is generally found the unappropriated portion of a nucleus; and hence the central eminence, surrounded by a depression, in those corpuscles which, from the above-mentioned cause, have the edge thickened. The nucleus of the blood-corpuscle in some instances resembles a ball of twine, being actually composed, at its outer part, of a coiled filament. In such of the invertebrata as the author has examined, the blood-corpuscle is likewise seen passing into a coil.

The filament, thus formed within the blood-corpuscle, has a remarkable structure; for it is not only flat, but deeply grooved on both surfaces, and consequently thinner in the middle than at the edges, which are rounded; so that the filament, when seen edgewise, appears at first sight to consist of segments. The line separating the apparent segments from one another is, however, not directly transverse, but oblique.

Portions of the clot in blood sometimes consist of filaments having a structure identical with that of the filament formed within the blood-corpuscle. The ring formed in the blood-corpuscle of man, and the coil formed in that of birds and reptiles, have been seen by the author unwinding themselves into the straight and often parallel filaments of the clot; changes which may be also seen occurring in blood placed under the microscope before its coagulation; and similar coils may be perceived scattered over the field of view, the coils here also appearing to be altered blood-corpuscles, in the act of unwinding themselves; filaments, having the same structure as the foregoing, are to be met with apparently in every tissue of the body. The author enumerates a great variety of organs in which he has observed the same kind of filaments.

Among vegetable structures, he subjected to microscopic examination the root, stem, leaf-stalk, and leaf, besides the several parts of the flower; and in no instance of phanerogamous plants, where a fibrous tissue exists, did he fail to find filaments of the same kind. On subsequently examining portions indiscriminately taken from ferns, mosses, fungi, lichens, and several of the marine algæ, he met with an equally general distribution of the same kind of filaments. The flat filaments seen by the author in all these structures, of both animals and plants, he states to be that usually denominated a *fibre*. Its appearance is precisely such as that of the filament formed within the corpuscle of the blood. It is known, he remarks, that discoid corpuscles circulate in plants; and it remains to be seen whether or not filaments are formed also in these.

By gradually tracing the fibre or filament above mentioned into similar objects of larger size, the author endeavours to show that it is not impossible to draw a line of separation between the minutest filament, and an object being to all appearance composed of two spirals running in opposite directions, and interlacing at certain regular intervals; an arrangement which produces in the entire object a flattened form, and gives it a grooved appearance. It is, in fact, the structure which, for want of a better term, he has called a *flat filament*. The edge of this filament presents what, at first sight, seem like segments, but which, in reality, are the consecutive curves of a spiral thread. A transverse section of such an object is rudely represented by the figure 8. This is also precisely the appearance presented by the minutest filament, generally termed *fibre*; and the author particularly refers to the oblique direction of the line separating the apparent segments in the smaller filament, in connection with the oblique direction of the spaces between the curves of the spiral threads in the larger one.

The spiral form, which has heretofore seemed wanting, or nearly so, in animal tissues, is then shown to be as general in animals as in plants. Nervous tissue, muscle, minute blood-vessels, and the crystalline lens, afford instances in proof of this. And if the author's view of identity in structure between the larger and the smaller filaments be correct, it follows that spirals are much more general in plants themselves than has been hitherto supposed; spirals would thus appear, in fact, to be as universal as a fibrous structure.

The tendency to the spiral form manifests itself very early. Of this the most important instance is afforded by the corpuscle of the blood, as above described. The author has also obtained an interesting proof of it in cartilage from the ear of a rabbit, where the nucleus, lying loose

in its cell, resembled a ball of twine, being composed at its outer part of a coiled filament, which it was giving off to weave the cell-wall;—this cell-wall being no other than the last-formed portion of what is termed the intercellular substance—the essential part of cartilage. These nuclei in cartilage, as well as those in other tissues, there is ground for believing to be descended, by fissiparous generation, from the nuclei of blood-corpuscles.

The author then describes the mode of origin of the flat filament or fibre, its reproduction, in various animal and vegetable tissues, which he enumerates. He conceives that each filament is a compound body, which enlarges, and, from analogy, may contain the elements of future structures, formed by division and subdivision, to which no limits can be assigned.

[Dr. Barry requests us to add the following, in connection with his memoir on Fibre, an abstract of which is given above.

The “white substance of the nervous fibre,” surrounding Remak’s “band-like axis,” consists of filaments having the remarkable structure above described, and often curiously interlaced with one another, as though each of them had a spiral direction. In examining the substance of the optic, the olfactory, and auditory nerves, as well as that of the brain and spinal cord, Dr. Barry employed for the most part such as had been preserved in spirit; and, besides using extremely minute portions, he very often avoided adding any covering whatever—the weight of thin mica itself being sufficient to rupture or to flatten this delicate substance, and thus entirely prevent its structure from being seen. In the parts last mentioned, he finds red discs, which pass first into rings, and then into spirals. In fasciculi from the spinal cord, and surrounded by spiral filaments, he met with a “band-like axis,” which perhaps corresponds to that of Remak in the nerves; but if so, Dr. Barry’s observations go farther even than Remak’s. The “axis” described by this observer was found by him to be susceptible of division into filaments. So also is the one described by Dr. Barry. But the latter adds, that each filament is a compound object, which enlarges, and, from analogy, may contain the elements of future structures, formed by division and subdivision, to which no limits can be assigned. The spermatozoa, mentioned in the abstract, were from the epididymis of a person who had died suddenly. The depression noticed in their discoid extremity—corresponding apparently to the “sugient orifice” of some authors—is probably analogous to the source of new substance in other discs. In these examinations, Dr. Barry has generally added to the objects dilute spirit (sp. gr. about 0.940), containing about $\frac{1}{200}$ th of

corrosive sublimate. Spirals from the leaf-stalk of the strawberry, after the addition of this reagent, were seen to have divided into parallel filaments having the same structure as those above described. Flax presented a quadruple coil of such filaments. In early states of voluntary muscle also, there were seen double and quadruple coils, evidently produced by the same means—division. Dr. Barry compares the appearance of the vegetable “dotted duct,” in its several stages, with that of objects found in mould, in the cornea, in the crystalline lens, and in voluntary muscle, all of which are produced by associations of minute spiral threads. The distribution of the remarkable filaments above described is so universal, that they are found in silk, in the incipient feather, in hair, in the feather-like objects from the wing of the butterfly and gnat, and in the spider’s web.

Dr. Barry informs us that he has had the opportunity of showing to several physiologists the principal appearances described in his memoir on fibre. And Professor Owen permits him to state, that he has exhibited to him spirals in voluntary muscle,—muscular “fibrillæ,” having a flat, grooved, and compound form,—the filamentous structure of “white substance in nervous fibre,”—the vegetable spiral becoming double by division,—a coiled filament within red blood-discs,—and the incipient unwinding of the coil in coagulating blood.

Extracts and Abstracts from Foreign Journals.

[From *Müller’s Archives*, 1842.]

Dr. Vogt makes some observations upon the young of a *Filaria* which he found in the blood-vessels of a frog in large numbers, and concludes, from his own and *Valentin’s* observations, that these entozoa are deposited by the parent in the space between the liver and pericardium, whence they insinuate themselves into the larger blood-vessels, and circulate with the blood for some time, and are finally deposited on the surface of the intestines. In this situation they become, as it were, imbedded, and cysts of effused fibrine are formed around them, in consequence of the inflammation excited by their presence. In these cysts they live and grow, until they become mature, when they emerge from them to deposit their young, which run through the same course.

Herman Meyer on the Structure of the Horny Integument of Coleopterous Insects.—These researches were made in all parts of the horny case of the *Lucanus Cervus*. In the natural condition, the substance of this tissue is so hard and brittle, that it is impossible to procure thin slices of it for

microscopic investigation; this difficulty, however, is surmounted, if it is macerated for some days or weeks in a solution of caustic potass, especially in a warm place. The alkali removes the greater part of a peculiar brown matter, and leaves the remainder unaltered in form, of a greyish-yellow colour, and cartilaginous consistence, well adapted for examination.

It will then be found, that the horny case is composed of three laminæ, viz., an external and an internal cuticle, and a central fibrous tissue.

The external epidermis is composed of cells, not very closely attached to each other, about 0.007—0.010 millim. in length, and 0.005—0.006 millim. in breadth. Their nucleus is a little smaller than the cell itself, and has one or more nucleoli. The internal epidermis is very delicate, and the borders of the cells composing it, are with difficulty made out. They however appear to be more rounded than those of the external epidermis, and by their more close allocation, assume a more or less hexahedral form. Their diameter varies from the 0.005 to the 0.010 millim. No nucleus can be distinguished in them; but instead, a spiculum projects in an oblique direction from the centre of each cell.

All these spicula lean in the same direction; they increase in thickness from their point of insertion to the middle, and thence taper to a fine point. Their length is about 0.006—0.008 millim., and their greatest thickness 0.002—0.003 millim. Both the external and internal cuticle are formed of but a single layer of cells.

The remaining or central part of the shell will now be seen to be composed of a transparent material, marked throughout by numerous dark lines, which are readily ascertained to be formed by several rows of smaller lines parallel to each other, and placed at regular distances. The appearances thus afforded are occasionally very elegant. The mass is readily split into several laminæ, the thinnest of which will be found to be made up of little transparent columns, with sharply defined, dark, parallel borders. The diameter of these columns is about the 0.008 millim.; and the above described lines correspond to their borders. These columns or prisms are connected together by the interlacement of delicate filaments, which pass very obliquely from the sides of contiguous columns, attaching them to each other. The direction in which these columns are placed forms an angle of 45° with the surface of the laminæ which they compose. The number of these laminæ is very various; in some instances as many as sixteen have been counted in the thickness of the horny case. In portions which have not been macerated in the alkaline solution, a layer of pigmentary matter, homogeneous, transparent, is observable between the outer epidermis and the proper horny substance.

In No. 2 of Müller's Archives for the present year, is a plate, with figures illustrating the mode of growth and structure of the confervæ found growing on frogs, salamanders, &c., by Dr. Hannover.

[From the *Comptes Rendus*, 1842.]

Schultz's Researches in minute Vegetable Physiology. This work contains :—

1. New researches on the universality of latex-globules in various families of plants ; on the size, form, and quantity of the globules ; circumstances upon which the greater or less milkiness of the fluid depends. The juices become more and more milky in proportion to the increase in number and diminution in size of the globules, and they are clearer as the globules increase in size and are fewer in number. Thus the latex of *Musa paradisiaca*, which is almost clear, has the largest globules with which M. Schultz is acquainted ; these globules may be compared to the large blood-discs of *Batrachians*.

2. Researches into the seat of the various chemical matters in the latex. The globules contain a kind of adipocire, which he has named (*safifett*.) This substance, mixed with other constituents not readily separable, and principally with the organic substance of the emptied globule, constitutes what has been hitherto called wax, galactine, and resin. The globules float in a plastic, coagulable, diaphanous fluid, (which M. S. names *plasma*), and which contains caoutchouc, gum, sugar, and salts. The caoutchouc is formed by the coagulation of the latex of all plants, whether milky or not, but in variable quantity. The formation of this substance depends upon the separation, during coagulation, from the juice of a considerable portion of the globules, by the absorption of a porous substance ; nevertheless, the caoutchouc of commerce still contains many globules, which may be recognized in a lamina submitted to the microscope. The caoutchouc of the figs (*Ficus elastica*) is worth nothing, in consequence of its imperfect separation from the globules, so that they continue mixed in large quantities with it, and render it tenacious, viscous, and less elastic. M. Schultz made experiments with the milk of the *Palo de Vaca*, which he received from Caraccas, with that of some *Euphorbiaceæ*, of *Ficus elastica*, and of *Asclepias Syriaca*, and with the clear latex of *Musa paradisiaca*, &c.

3. Researches on the transformation of the sap into latex. At first the sap contains gum, which is converted sooner or later into grape-sugar, which is again afterwards changed into cane-sugar. In some plants the gum undergoes but little change, and is always present in great proportion, as in the vine ; in others, the metamorphosis does not pass beyond the change into grape-sugar, as in the birch ; and in others, again, the greater part of the gum is very rapidly converted into cane-sugar, as in the maple. But the sap of this tree at first contains a large quantity of gum, especially in the autumn, but very little in spring, so that there is always some grape-sugar mixed with the cane-sugar.

The gum and sugar remain in the latex, and their solution forms the fundamental liquid of the *plasma*, in which the globules are formed after its aeration. The sap, towards the period at which the buds are bursting forth, shows a great disposition to the formation of globules.

The gum of the latex is, like that of the sap, similar to the gum of starch. The sugar of the latex is always grape-sugar.

4. New observations on the vessels of the latex and their kinds. In those plants in which the acid of the latex (which juice always contains an acid) is the gallic, as in the *Musa paradisiaca*; the distribution of the laticiferous vessels can readily be distinguished without any other preparation, by placing a portion of a living leaf into a solution of a salt of iron, which blackens the network of vessels, when it has penetrated the tissues as far as the latex.

5. Observations on the evolution of the laticiferous vessels, in the cortical layers of trees. Some trees acquire several layers in a summer; others require several years for the formation of one, which gradually increases in thickness, and others form an annual layer.

There is a great difference between the mode of formation of the woody and cortical layers.

6. Observations on the distribution of the latex in the contracted vessels, and the cellular parenchyma of the medulla, of the epidermis, of the hairs, &c.

Donné on the Origin of the Blood-globules, their Mode of Formation, and their Destination.—In blood there are three kinds of particles:—1st. The red or blood-globules properly so called. 2nd. The white globules, which have not been well known until lately. 3rd. The chyle corpuscles.

The red globules are flat in every kind of blood; they are circular in that of mammals; and elliptic in that of birds, fish, and reptiles. The elliptic globules alone present a solid substance in their interior: the existence of a central nucleus cannot be demonstrated in the circular globules.

Contact with water changes all the blood-globules into small spheres, and it is to this circumstance, unknown to ancient observers, that we must attribute the opinion of some of them respecting the spherical form of the blood-globules of mammals, as well as the spherical shape which they supposed was present in the blood-globules of birds at the time of their formation in the embryo: this shape is only secondary, and is caused by the water which is made use of to dilute the blood, or to prepare the embryo of the egg.

The proper blood-globules of mammals, or the circular globules, are entirely soluble in acetic acid; but the proper blood-globules of birds, fish, and reptiles are only partly dissolved by it; the internal substance or nucleus resists the action of this agent. All blood-globules, whatever may be their shape, or the class to which they belong, are soluble in ammonia, and insoluble in nitric acid.

The proper blood-globules, or the red globules, appear to be formed of a flattened vesicle, containing a solid substance or nucleus in the elliptic globules, and a fluid in the circular ones.

The anomaly which has been remarked in the blood-globules of *Camelidæ*, has reference only to their shape, and not to their intimate structure, which is exactly similar to that of the blood-globules of other mammals. The white globules are colourless, spherical, with slightly

fringed margins, and as it were granular. They are present in the blood of all animals, and may be seen circulating in the blood within the vessels; their number is greater than might be imagined; they are burst by water, dissolved by ammonia, and shrivelled by acetic acid; they appear formed of three or four solid granules or corpuscles, enclosed in a vesicle.

These corpuscles measure only $\frac{1}{300}$ th of a millimeter in diameter, and are exactly similar to chyle corpuscles.

Neither the mode of formation nor destination of the blood-globules has been hitherto known. The result of M. Donné's researches on this subject is as follows:—

The blood-globules are not all identical, nor in the same stage of formation; they do not all resist the action of chemical re-agents in the same manner; and the difference of their properties indicates that they are not all arrived at the same degree of development.

The corpuscles are the product of the chyle constantly poured into the blood; these corpuscles unite together by three or four, and become enveloped in an albuminous covering whilst circulating with the blood: in this manner they constitute the white globules.

When once these white globules are formed, they gradually change their shape; they become flattened, coloured, and the internal granular matter becomes homogeneous or dissolved; ultimately they are converted into the proper blood or red globules.

The red blood-globules themselves have only a limited existence. They dissolve in the blood at the expiration of a certain time, constituting the liquor sanguinis properly so called. Certain substances are susceptible of an immediate change into blood-globules, when mixed directly with the blood. Milk, which, from its organic constitution, as well as from its principal elements and physiological properties, has the greatest analogy to the blood, is best fitted to demonstrate this change.

Injections of milk into the veins of animals in certain proportions, produce no ill effect, and the nature of its globules allows us to follow and to recognize them everywhere.

Besides, observation proves, that these globules injected into the vessels are immediately changed into blood-globules by the same mechanism which causes chyle corpuscles to become white globules, and these latter to be transformed into red globules.

The spleen appears specially destined to effect this change; for it is in this organ more particularly that we find the greatest number of white globules, in every state of formation.

The examination of the circulation in the most vascular organs, does not show that the blood-globules leave their vessels for the purpose of combining with other organs, or with organic elements; but the fluid part of the blood passes through the vascular parietes, and constitutes probably the essential organizing medium.

In conclusion, young animals, when brought up on other substances than milk, are less perfectly nourished than those which are left completely to nature; and the influence of an inappropriate nourishment, may go far towards altering the shape and nature of the blood-globules.

M. Tristran's third Memoir on Phytology.—This memoir is confined to the study of the spiral and large sap vessels.

The author considers that certain spiral vessels have originally been formed of a simple membrane, which is afterwards cut down into a helix; but he maintains that other spiral vessels, or tracheæ, are originally formed by one or more filaments which grow at their extremity, turning in a helix, and to these there may *afterwards* be added a membrane, which unites the turns of the spiral. He considers that the position of the tracheæ is too much restricted, when they are supposed to be confined only to the medullary sheath. He believes that plants (*à faisceaux didynames*) should be considered as having their tracheæ in the thickness of the ligneous substance. In other plants he shows the elements of the tracheæ (under the name of scattered filaments) even in the external ligneous layers of the stems of several years growth.

With respect to the sap vessels, he endeavours to recognize the more essential features of their different forms, with a view to their classification, according to a natural method; but there is so much obscurity still on this subject, that the author conceives that it is necessary to adhere at present, at least provisionally, to an artificial method, which he proposes.

M. Arago presented to the academy a microscope, manufactured by Lerebours, and furnished with achromatic lenses of very short focal distance, executed by M. Nachet. One of these lenses was ground in a curve, the radius of which was half a millimètre.

M. Gruby "On the Entozoa of the Frog, and on some Points in the Pathology of that Batrachian."—M. G. remarks that

"The existence of several species of entozoa in different parts of the bodies of frogs, is known to every one; he himself has observed them frequently in the urinary bladder, in the cellular tissue which surrounds the subclavian veins; in the lungs; in the intestines, and in the cellular tissue of the peritoneum. In the latter situation the worms were enclosed in small pouches of $\frac{1}{8}$ to $\frac{1}{4}$ of a millim. The pouches being transparent, enabled M. Gruby to see the entozoa within them manifesting every sign of vitality: these were of the genus *Filaria*, and their different parts could be readily distinguished. He saw the ova of this entozoon not only circulating in the vessels with the blood, but saw them also in the spinal canal. He observed some *Ascarides* within the sheath of the nerves, among the primitive nervous fibrillæ. The length of these worms was from $\frac{1}{50}$ to $\frac{1}{40}$ millim.; their width $\frac{1}{200}$ millim.: they were transparent, and moved slowly.

In the lungs, they were lodged in the air cells, surrounded with a yellowish, firm substance, presenting under the microscope, all the characters of tuberculous matter.

Desirous of studying the cause of the formation of these tubercles in the lungs of the frog, he injected ovula into the blood of this animal, and observed that some were arrested in the capillary net work of the lungs, and some in that of other transparent portions of the body. He

was at the same time enabled to appreciate all the changes which the ova produce in the different tissues, and also the changes which the ova themselves undergo, and so follow as it were, under the most favourable circumstances, their development. Among the embryogenic facts which he was thus able to determine, he cites the formation of the three envelopes of the embryo, the manner in which the vitelline cells become grouped to form the macula germinativa, and, finally, the development of the embryo itself, and the movements it performs in its transparent ovum.

Observations on the alteration of the tissues in which the ovula may be lodged, is soon interrupted by the effusion of coagulable matter, which prevents further microscopic examination. In the lung he observed the pathological products to be deposited around the ova, and giving rise in this way to the tubercular appearance mentioned above.

M. Gruby injected the ova of many species of entozoa, but without success with the majority. He succeeded best with the ova of a species of *Monostoma* (*Distoma*?) which is frequently found in the bladder of frogs.

M. Gruby presented to the academy various pathological productions, chiefly relative to the frog, and the development of which was owing to the presence of entozoa.

1. Pulmonary vesicles, filled with tubercular matter.—This was a portion of the lung of a frog filled with tubercular matter, presenting all the physical and anatomical characters of tubercle in the human subject, and the development of which was the consequence of the deposition of the ova of entozoa in the lung.

2. Tubercular matter of the pylorus (of the frog?) by which that orifice was much contracted, and also caused by the deposition of ova between the peritoneum and muscular coat. And several others which do not appear to have any connection with this exciting cause.

M. Bourguery's Researches on the Intimate Structure of the Lungs in Man and the Mammalia.—These researches, embracing many divisions of the subject, are related in as many special memoirs, and include—

1. The normal microscopic anatomy of the lungs, and its physiological application.

2. The morbid microscopic anatomy.

3. Anatomico-physiological inquiries as to the general form of the pulmonary vessels.

4. Physiological experiments on the capacity for air and the degree of permeability of the lung to air, under different conditions, in the two sexes, and at different ages.

The first memoir relates to the first of these subjects, and commences with the description of the minute anatomy of the air tubes. When M. Bourguery commenced his investigations, there existed three theories as to the intimate structure of the aerian capillaries, referred respectively to Malpighi, Willis and Helvetius. Malpighi (1661), who was the first to discover the membrano-cavernous structure of the lungs, con-

ceived that the functional tissue of these organs was formed by an almost infinite number of orbicular and sinuous vesicles, all communicating with each other. Helvetius (1718), with some difference of view as to the nature of the tissue, admitted with Malpighi the existence of cells opening into one another, within each lobule, but denied the communication of cells in different lobules. But, before him, Willis had represented the pulmonary tissue as being formed of prolongations from the ultimate ramifications of the bronchial tubes, not communicating with each other, and which radiate towards the periphery, where they terminated in a blind extremity. This theory has since gained much favour, under the name of that of Reisseissen.

M. Bourgery considers, as a previous question of great importance, that which relates to the mode of preparation of the lungs: Malpighi and Helvetius principally studied the lung when inflated; Willis, Reisseissen and his followers chiefly used injection with mercury. These two exclusive modes of preparation explain the difference in the theories which have occurred to different observers. M. B. himself has employed all sorts of injection, but is of opinion that the lung is best studied when dried and inflated, with the vessels injected, this mode allowing the deeply-seated canals to be seen, as well as those at the surface, which only, are visible when opaque materials for injection have been used.

When the lung thus prepared is examined under the microscope, it is seen to be composed of minute sinuous canals, in the walls separating which the blood-vessels are situated. The appearance of these canals is everywhere the same, whatever may be the inclination, with respect to the pleural surface, of the section by which they are exposed. All are equally various in direction; the greater number, however, are more or less perpendicular to the surface; but others are occasionally met with parallel, or horizontal, and being divided longitudinally, present the appearance of a groove or gutter. All these canals are exceedingly tortuous, and communicate with each other at their sides and at their extremities, by a vast number of openings.

Such are, according to M. Bourgery, in general, the true aërian capillary vessels of the lungs. These sinuous canals, opening into each other and turning in all directions, forming by their involutions an intricate mesh, through which the blood-vessels pass, convey the idea of a minutely divided space with innumerable tortuous branchings, and uninterruptedly continuous in all parts, having no termination but the entrance into it, which is at the same time the place of exit: it is, in fact, the image of a true labyrinth, in three of its dimensions, and this consideration has induced M. Bourgery to name these tubes the "*labyrinthine aeriferous canals*," in order to distinguish them from the "*ramified canals*," which constitute the termination of the bronchial tree. In order to comprehend the latter, we must refer to the mode of composition of the lobules. Each of these bodies commonly receives a single central bronchial branch, which forms the common trunk of its subsequent divisions, and extends to the peripheric extremity of the lobule. Starting from this central trunk, which gradually decreases in size, the secondary ramusculi which constitute the *ramified bronchial canals*, arise

in alternate succession, and radiate in a stellate manner; these are the ultimate expansion of the tracheal tree. Each of these tubes terminates in a small irregular, sinuous dilatation, elongated, and either single, bifid or trifid, pierced in each of its compartments by one or more orifices of the *labyrinthine* canals, and opening finally into one of these which thus forms a continuation of the original canal.

M. Bourgerie proceeds to the description of the sanguiferous capillary system.

There are two kinds of pulmonary capillaries which appear to have a corresponding difference in their functional destination. The one of these is formed of an endless chain of annular vessels, and, speaking comparatively, of considerable size. The other consists of a membranous network of very minute capillaries, which fill the areolæ of the larger vascular rings.

1. The *annular vessels*.—These vessels are enclosed between the walls of the air tubes. Their form and their anatomy are always the same. A radical arteriole represents a stem, the divergent branches of which form a cone or tree. Two principal ramifications arise from it and penetrate the intercanalicular septa “en interceptant un premier canal rétréci dans l'espace triangulaire qui le renferme.” Beyond this they surround the contiguous (aeriferous) canals by as many polyhedral or circular rings formed by a single vessel. The same disposition is repeated at short distances, all the canals being as it were thus surrounded by annular vessels, interposed in their septa, of from $\frac{1}{3}$ to $\frac{1}{5}$ of their volume ($\frac{1}{16}$ to $\frac{1}{25}$ mill.) which anastomose with each other, at the points where the circular turns touch back to back, or at the points of intersection. At the other extremities the annular vessels by their junction again form branches, the inosculations of which constitute venules; so that on a section either between two branches arising from an arterial trunk, or from two neighbouring arteries, or in the intermediate space between the arteries and venules the surface is formed by a network of these annular vessels, communicating with each other, or rather continuous everywhere without interruption, and becoming less in diameter from the branches towards the central point of junction. The general aspect of this surface, penetrated in all directions by the canals, which are bounded by the vascular septa, resembles a net. The same disposition obtains at whatever inclination the sections may be made.

2. *Net-work of minute capillaries*.—This system of minute vessels, is placed within the membranous wall itself of the aerian capillary canals, both the bronchial ramified, and the labyrinthine branches. It is seen then, at the surface separated from the atmospheric air, in the normal state, merely by a very delicate expansion of membrane, and it is situated on a plane more superficial, than the annular vessels which run in the intercanalicular septa.

In order to comprehend this system of the minute capillaries, it is necessary to consider it under two aspects, first, in minute distinct fractions, and, second, as a whole.

1st, Considering it in parts. It occupies the areolæ formed by the annular vessels and their anastomosing branches, and forms in the

internal aërian membrane as many small reticulated surfaces as there exist polyhedric areolæ between those vessels. Anatomically, this network is composed of an uncertain number of minute branches of a third or fifth of the size of the annular vessels, into which they open at various points of the circumference of the area enclosed by the latter, and divide into very delicate ramusculi, which are lost in a net-work of still more minute capillaries of uniform size, and about $\frac{1}{100}$ mill. in diameter, and by which minute net-work the whole surface is covered. These capillaries anastomose frequently with each other, and form so close a texture that the spaces between them, even under high magnifying powers, appear only as points.

2nd. Considered as a whole. The little polyhedric spaces above described anastomose with each other at their borders, and constitute by their junction a vast surface of capillary net-work, occupying the full extent of the pulmonary air membrane.

Intercanalicular septa.—These constitute the intervals which separate the canals.

Their thickness varies from $\frac{1}{4}$ to $\frac{1}{2}$ of the diameter of the canals, and they are composed of two small (petites) membranes, segments of the circular walls of two canals, and between them are enclosed the annular vessels and the minute labyrinthine canals.

M. Dujardin's "Complete Manual for the Microscopic Observer."—This work, which is quite original in the choice of the designs, of which it is composed, and in the mode of view expressed in these designs, is intended to show how the details of a great number of "test objects" may be seen at the present time with the most perfect microscopes; and it is at the same time a collection of abundant materials serviceable for the study of the intimate structure of organized bodies. The author has attempted to demonstrate by correct figures the true constitution of the blood globules, or corpuscles, which when deprived of external membrane, can be agglutinated, drawn out and deformed in various ways under the influence of reagents; and has endeavoured to show that the nucleus which belongs only to the blood globules of birds and other oviparous animals, is nothing else than the first degree of alteration. He also believes that he has demonstrated the true origin of the spermatozoa, or pretended spermatic animalculæ. He has represented the mode in which these bodies originate in the mucous covering of the tubuli seminiferi, or in mucous globules, which soon become isolated, and which have been mistaken for vesicles. He proves also that in certain circumstances, the fibres or lamellæ of the crystalline lens are transversely striated or grooved, a marked indication of their contractility. The figures representing the modifications which the nervous substance undergoes when in contact with water, will serve to show, as the author expects, the slight foundation upon which is based the opinion which admits of nervous filaments originally provided with enlargements (varicose fibres).

A great number of figures are intended to represent the true structure of the muscular fibre, examined in the whole animal series, and under different degrees of alteration. Hairs, scales and various epidermic pro-

ductions are the objects of numerous designs, by which it will be shown that those hairs of vertebrata which continue to grow, are provided with an external scaly envelope, and that their interior is homogeneous, fibrous, and sometimes furnished with a canal, whilst, on the contrary, those of definite growth are hollow in the interior, or provided with aeriferous cells, as are feathers, the relation of which, to the hairs of certain *Rodents* will be easily perceived. The hairs or scales of the *Articulata* are formed essentially of a flattened membranous vesicle, filled with air, and more or less folded or striated. Ivory, teeth, the vibratile cilia of mucous membranes, &c., are also figured as they appear under an excellent microscope. The author has also represented vegetable organs and tissues, woody fibre, vessels, starch, pollen, &c. In the execution of these figures, he has represented the objects, such as they appear to an experienced eye, through a good microscope with magnifying powers of 300 to 400 diameters. He has been careful to note the modifications of appearance caused by different modes of éclairage, and the greater or less distance of the objective. It is known that the influence of these circumstances may be such that the same object will appear full or empty, convex or concave, to different observers who do not pay sufficient attention to them.

Several figures are given of the different appearances which one and the same object may present under these circumstances.

Report on a Memoir by M. Doyère, relative to the Revivification of Tardigrada and Rotifera.—Shortly after the existence of swarms of animalculæ in water containing organic matters, had been revealed by the microscope, the use of that instrument led to the discovery of another fact, equally unexpected, and more difficult of comprehension, in as much as it still more widely differed from all the results heretofore arrived at from the study of animated beings. In fact, by the examination of dry dust collected from a gutter, Leuwenhoeck ascertained the existence of an animal which, under the influence of desiccation, ceased to move, lost its form, and no longer gave any signs of life, and which, in this condition, appeared to differ in no respect from a dead body, as it were mummified, by being deprived of the fluids necessary for all animal existence, and yet which, after having been preserved for a long period in this dried condition, was restored to life by contact with a drop of water. Leuwenhoeck did not perceive the whole extent of the singular fact which he had thus discovered, with respect to the Rotifer of house roofs, and did not pursue his researches further on this subject; but a phenomenon of this kind could not fail to excite lively curiosity among zoologists, and to give rise to long controversies, as well as to interesting experiments. It may be remarked that the discovery of Leuwenhoeck soon ceased to be an isolated fact in science, for Needham announced that the eels of mildewed corn possessed, like the Rotifera, the faculty of reviving after having been completely dried; and Spallanzani arrived at the same result, after observation, not only of the Rotifera and Anguillula, but also of another microscopic animalcule, to which he gave the name of Tardigrade (*R. tardus*).

The investigations of this skilful observer were numerous and con-

ducted with the profoundly scientific spirit which characterizes all his labours, and might perhaps have been deemed sufficient to convince naturalists as to the truth of the fact, and to serve as a basis to subsequent inquiries.

But the results thus obtained carried little weight, and it would be easy to give a long list of naturalists, who, even at present, deny in the most positive manner, what has been termed the *revivification of Rotifera*.

Latterly, it is true, M. Schultz has successfully repeated some of Spallanzani's experiments, and has furnished many naturalists with the opportunity of making similar researches; but still more lately, M. Ehrenberg has added the weight of his great authority to the opposite opinion, and having formally rejected the opinion of Spallanzani, has attempted to explain the way in which an error of the kind could find its way into science.

This interesting and much debated question, then, could not be considered as definitively settled, and appeared to demand further investigation. It was necessary to examine carefully all the circumstances attending the phenomena described by Leuwenhoeck, Needham and Spallanzani, to submit to the proof of experiment, the objections and hypotheses presented by others, antagonists of these celebrated observers, and to acquire new facts by which one or other of the contradictory opinions of naturalists might be supported or refuted. This difficult task has been undertaken by M. Doyère.

The *Rotifera* and the *Tardigrada* are found, as is well known, in the moss growing upon roofs, or in the sand found in the gutters of the roof, and are seen in the living state, when these matters, after having been for a long time dry, are wetted with water. The fact of the appearance of these animalculæ in a living state in dust which had been dry during months, or even whole years, can no longer be disputed, and it is equally well demonstrated that, with these minute beings as with animals of a higher class, evaporation of their fluids, carried to a certain extent, induces the abolition of every sign of vital motion. The partisans of Spallanzani's opinion regard the reappearance of these living beings as a sort of resurrection; and the advocates of the contrary opinion think that the phenomena may be explained in a simpler manner; the opinion of some is that the *Rotifera*, &c., are of an amphibious nature, and capable of living in dry air as well as in water or sand. where the moss with which they are surrounded would preserve them from too complete desiccation, so that in fact, in the above cited instances, the active state of the animalculæ would never even be interrupted, and these little animals buried in apparently dry dust, would still meet with sufficient humidity to prolong their lives and to allow of reproduction, so that those which have been supposed to become revived would be in reality, to use the expression of M. Ehrenberg, only the great-grandchildren of those observed in the same material at the commencement of the experiment. According to other naturalists, the desiccation of the sand or moss containing the *Rotifera*, would infallibly kill the animals themselves, but would not destroy the vital principle in the ova which they may have deposited, and, consequently, instead of witnessing the resurrection of the animals themselves, we only see the

ova rapidly developed by the influence of the water, and giving birth to animalculæ whose growth would be equally rapid.

Finally, there are other physiologists who consider that the Rotifera, &c., of dry sand do not undergo a complete desiccation, but such a degree of it only, as to plunge them into a sort of torpor, and conceive that these animalculæ, although to all appearance dead, yet preserve a latent life, but still a real life sufficient to establish a bond of connection between the active life which precedes the evaporation of the fluids, and that equally active, when they are restored by the addition of humidity to the full exercise of their functions.

The observations of M. Doyère overturn all these hypotheses, and confirm in the clearest way, the results obtained by Spallanzani:—

Thus, in answer to the arguments employed by Ehrenberg, it is sufficient to observe, that living Tardigrada are never found in the dry dust of gutters, but that, by the aid of the microscope, corpuscles can be seen which entirely resemble the dead bodies of these animalculæ, deformed by desiccation, and that in matters where no living being was previously discernible, living Tardigrada frequently appear on the addition of a little distilled water. M. Doyère is even assured that it is not impossible to revivify these animalculæ, if taken one by one and dried separately on pieces of glass, without being surrounded with sand or other material, organic or inorganic, capable of preserving them from the ordinary effects of evaporation.

In his experiments he has been able to count them, and to trace in each separate individual all the phases of desiccation; to observe them gradually assume the appearance of dead bodies, and to determine afterwards that these same bodies, dry and brittle, are susceptible of re-assuming their primitive form, and of returning to life under the influence merely of a few drops of water.

This experiment appears to be decisive; but it may still be asked, whether the drying which the animalculæ have undergone has been complete, and if the privation of all the water contained in their tissue, would not render them incapable of resurrection, after having in this way passed years in a state of apparent death?

In order to determine satisfactorily this highly interesting physiological question, M. D. had recourse to the most powerful means of desiccation employed by chemists in the analysis of organic substances.

He suspended for five days, in the vacuum of the air-pump, over a vessel containing pure sulphuric acid, some Tardigrada surrounded with sand, or uncovered and dried upon slips of glass; and he left others during thirty days, in the Torricellian vacuum, dried by chloride of calcium; and in all these instances he obtained some resurrections. These results are of great importance towards the solution of the question which M. Doyère had proposed to himself; but he still conceived that they might be considered as offering only a strong probability in favour of the complete desiccation of the animalculæ, in which the faculty of becoming revived was retained; he continued his experiments, and by studying the influence of elevated temperatures upon these singular beings, he arrived at the discovery of the most decisive and surprising facts.

It is known that animals perish when their temperature is raised above a certain limit, inferior, however, to that at which the white of egg coagulates, and which, in the majority of cases, does not exceed 50° cent. (122° F.) Animalculæ capable of resurrection are not excepted from this law; M. Doyère is satisfied that the Rotifera and Tardigrada perish when the water in which they swim is heated to 45° cent. (105° F.) and that they cannot then be recalled to life by any means. But he has found that this is not the case when the animalculæ have been previously dried. If, instead of experimenting upon Tardigrada in full life, it is done upon individuals which have lost all their humidity by the ordinary means of desiccation, and which appear as dead, it is possible, without depriving them of the faculty of reviving, to raise their temperature to a degree which would necessarily involve the disorganization of all living tissue containing any water beyond that chemically combined with its constituent principles. In an experiment repeated in the presence of the Commission of the Academy, a certain quantity of moss containing Tardigrada, after having been properly dried, was placed in a stove, and around the bulb of a thermometer, the stem of which extended out of the apparatus; heat was gradually applied, until the thermometer thus placed in the centre of the moss, indicated a temperature of 120° cent. (248° F.) This considerable heat was maintained for several minutes, nevertheless, some of the animalculæ contained in the moss returned to life, and appeared in their usual condition after they had been placed for 24 hours in a suitable degree of moisture. In other experiments, M. Doyère submitted some dried animalculæ to a heat of more than 140° cent. (284° F.), and still witnessed some of them revive after immersion in water. These facts are in themselves of considerable importance towards the solution of the question at issue, and the result without doubt depends upon the circumstance first pointed out by M. Chevreul, that albumen, deprived of its water by previous drying, can be submitted to a much higher temperature without, in consequence, losing its solubility, than it could be if exposed to the same temperature in the moist state; and from the simple fact that a Tardigrade exposed to the action of a temperature of 120° c. (248° F.) can still be made to revive, it may be concluded, with great probability, that the whole of the water chemically free in its body had been dissipated, a degree of desiccation which would preclude all idea of vital movement. Thus the Tardigrada and Rotifera, when dry and retaining the property of living when moistened, cannot be considered as actually alive, and their mode of existence can only be compared to that of a seed, which is organized so as to live, and which will live when exposed to the influence of air, of water and of heat, but which, in the absence of one of these excitants, manifests no sign of activity or life, and can be preserved thus for ages, although the duration of its real life may not exceed perhaps a few weeks.

M. Doyère has also given a detailed and excellent account of the anatomy of these animalculæ, including, especially, the nervous and muscular systems; and his work is illustrated with beautiful and exact figures.

Microscopical Memoranda.

E. J. Quekett on Vegetable Fibre.—"I perceive that in the number of the Microscopic Journal for May last, it is mentioned that "an error has been pointed out" respecting the date of my having made some observations on a peculiar vegetable structure, visible in a certain specimen of coal; and it is stated, that the object of correcting such was, "because it involves a question of priority as to two discoveries, the one by Dr. Barry in recent vegetable structure, the other by Mr. Quekett in the remains of vegetable fibre found by him in a specimen of coal and of silicified coniferous wood."

The date of the observation was certainly wrongly given in the Journal, being one year too early; but in mentioning the subject, I had not the slightest idea of doing so with a view to claim any priority in the discovery, but merely to exhibit the perfect state of preservation of a singular tissue in a specimen of coal.

If the statement made by Dr. Barry in December last, for which he claims a priority of observation, be contrasted with that made by myself in March last, it will be obvious that the observations of Dr. Barry do not appear to have reference to the same fact as my own; his relate to the *structure* of the fibre of a vessel of a plant, and mine to the *arrangement* of the fibres irrespective of structure.

Dr. Barry states (No. 51, p. 364, Proc. of Royal Soc.), that the apparently simple "fibre"—(vegetable or animal), "being to all appearance composed of two spirals running in opposite directions and *interlacing at certain regular intervals*,"—"a transverse section of such an object is rudely represented by the fig. 8."

Contrast this statement with that to which I am reported to have made, viz., "where there are more than one row of dots on each (woody) fibre, these dots appeared to be formed by two spirals wound in the *interior* in different directions, the *turns of each* connected at intervals by *longitudinal* bands, thereby leaving a transparent space by such arrangement." Nothing is here stated of two spiral fibres interlacing with each other, but that the *turns* of either spiral are connected to each other by longitudinal bands, and not that one spiral fibre interlaces with the other. In fact, if a section of the tube containing the fibres be made transversely, it would not in any respect resemble the figure 8; but would exhibit the plan as if three cylinders were placed one within the other, the outer entire, the inner two perforated with oval holes, in one taking the direction of a right-handed, and in the other of a left-handed screw, the holes (dots) being formed as before stated.

As regards the apparently simple fibre of an ordinary vessel of a plant "being to all appearance composed of two spirals running in opposite directions, and interlacing at certain regular intervals," is a structure

which, in the recent tissue, I am unable to see* or comprehend; if it be only to be observed under the effects of decomposition or chemical reagents, then it is possible that appearances so produced may be delusive.

The fact of two spirals occurring in the same tubes or cells, is known to every vegetable anatomist. Many species of *Jungermannia* possess elaters of this structure; and in the wood of the yew, the same has been noticed years ago; but in neither case, nor in any *recent wood* that I have ever examined, is a structure to be found precisely like that to be seen in the coal which I exhibited. The nearest instance occurs in the wood of *Drimys Winteri*, which I believe was first noticed by Dr. Robert Brown. Therefore I trust the justice will be done me, to allow this statement to contradict that part of the paragraph in the Journal, viz., "it will be obvious that Mr. Quekett was mistaken when he stated his belief, in reference to his own observation, that 'nothing analogous had hitherto been detected in recent woods.'"—*Letter to the Editors.*

[The mistake as to the date of the meeting of the Microscopical Society, at which Mr. Quekett's observations were made, is sufficiently obvious; and with reference to the supposed coincidence of Dr. Barry's and Mr. Quekett's description of vegetable fibre, the above letter renders it quite evident, if it were not so before, that the observations and descriptions of these gentlemen regard two entirely different objects, and in no respect interfere with each other. Dr. Barry refers to the supposed structure of what he terms elementary fibre, and Mr. Quekett's to the mode of arrangement of an organ which may or may not be composed of Dr. Barry's double spiral filaments.]

On the Extent of the Ova of an Acarus.—It may be interesting to microscopic observers to be informed, that the pebbles of the gravel on Blackheath and the neighbourhood, are at the present time abundantly covered with the ova of the *Acarus* lately described by Mr. White, and formerly considered as a fungus under the name of *Craterium pyriforme*.

Before the late rains, these bodies were to be seen on pieces of wood and many other substances, as the stalks of plants, &c., as well as on the pebbles. We have lately seen specimens of the same deposit on pebbles, from Lincolnshire and from Devonshire or Cornwall in the neighbourhood of Plymouth; from which it would appear to be very generally distributed throughout the country. It may not improbably perhaps prove to be the ovum of the harvest bug, (*Acarus autumnalis* of Shaw.)—E. M. J.

* I have examined the fibre of the spiral vessels of the strawberry leaf, placed in a solution of corrosive sublimate and diluted alcohol, as recommended by Dr. Barry, but have not yet been able to discover the bi-spiral character of the filaments.—E. J. Q.

XXXVI.—REMARKS ON THE STRUCTURE OF FIBRE.

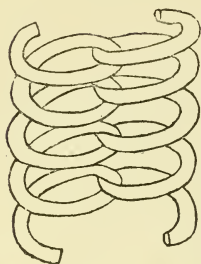
By the Editors.

THE abstract of Dr. Barry's views on the spiral structure of animal and vegetable tissues, which was given in our last number, would hardly, perhaps, convey a sufficient notion of the extent to which they reach; to understand which, it will be as well to peruse the catalogue of the parts in which Dr. Barry has observed the same kind of filaments, as given by him in the Philosophical Transactions, viz. :—

“The cortical and medullary substance of both the cerebrum and cerebellum, the spinal chord, the optic nerve and retina, the olfactory and auditory nerves, nerves connected with the spinal chord, voluntary and involuntary muscle (the latter including muscle in all parts of the alimentary canal, and the Fallopian tube and uterus, as well as blood-vessels, the iris, and the heart), tendon, elastic tissue, cellular and fatty tissue, serous membranes (peritoneum, pericardium, and arachnoid membrane), various parts of the so-called mucous membrane, the lining membrane of the large blood-vessels, and the valve of a large vein, the skin, the dura mater, and the sheath of the spinal chord, ligament, the gums and palate, the stroma of the ovary, the testis and the walls of the vas deferens, the kidney and ureter, the glans as well as the corpus spongiosum and corpus cavernosum penis, the coats of the gall-bladder and of the cystic duct, the pancreas, and the liver. He found them along with the marrow from a bone, between the rings of the trachea, as well as in the substance of the lungs, and the gills of the common Mussel, in the parenchyma of the spleen, the lacrymal gland, the sclerotic coat of the eye, the conjunctiva, the cornea, the membrane of the vitreous humor, the capsule of the crystalline lens, the lens itself, the cartilage of the ear and cartilage of bone, bone itself, the periosteum, the claw of the bird, the shell membrane of the egg, substance connecting the ova of the crab, silk, hair, the incipient feather, the feather-like objects from the wing of the butterfly and gnat, and the spider's web.”

These are the principal of the animal structures in which Dr. Barry has found filaments such as he describes. Of plants he subjected to microscopic examination, the root, stem, leaf-stalk, and leaf, besides the several parts of the flower: and in no instance where a fibrous tissue existed, did he fail to find filaments of the same kind, as well in Phanerogamous as in Cryptogamous plants. The flat filament seen by him in all these structures of both animals and plants, is that usually deno-

minated a "fibre," and described in our last No., p. 238. He conceives "this filament to be in fact composed of two spirals running in opposite directions, and interlacing at certain regular intervals;" and we are desirous here of drawing attention to his remark as to the oblique direction of the line separating the apparent segments in the smaller filaments, in connection with the oblique direction of the spaces between the curves of the spiral threads in this larger one, as it will be found of some importance when we speak of the ultimate structure of muscle.



The mere perusal of the catalogue of parts given by Dr. Barry, as the principal of those in which he has observed these peculiar filaments, is sufficient to prove how extensive such a structure must be, and consequently how important it becomes in all inquiries connected with the minute structure of bodies, to determine whether his views are correct, or whether he has not been misled by erroneous and easily misinterpreted appearances, in objects so minute and so indefinite in structure and consistence, and so readily altered by slight causes, as many of the tissues he enumerates, obviously are. It is somewhat humiliating, however, in the present comparatively advanced state of microscopical observation, to find, that such extraordinary facts as those adduced by Dr. Barry with regard to the structure of bodies so familiar as most of those in his list are to all, who have employed the microscope to any extent, should even admit of dispute; and, on the one hand, that if false, their truth should, to a certain extent, have been admitted by many whose opinions justly bear great weight in questions of this kind; or, on the other, that if true, they should have been equally repudiated by others, who have enjoyed equal opportunities of accurate investigation, and been animated with the same desire to arrive only at the truth. Such, however, is the case. We, among others, have repeatedly and carefully examined most of the parts and objects enumerated in Dr. Barry's list, with the aid of microscopes of the best construction the present day will afford, and have been unable, in a single instance, to satisfy ourselves of the existence of fibres or filaments, having the structure described by Dr. Barry. Appearances, however, have been frequently met with, which, by imperfect éclairage, or other accidental circumstance, might readily be interpreted, as they have been by Dr. Barry.

Our limits will not allow us to pursue the subject through the whole of Dr. Barry's list, nor even to touch upon all the sections of his paper;

and we shall confine ourselves at present to the consideration of the supposed formation of the filament within the blood-discs, and to some few observations on the elementary structure of muscular fibre,—two of the most important points, perhaps, to which Dr. Barry's hypothesis refers; and it may be reasonably inferred, that, if it can be shown that the appearances he has remarked, as leading to the conclusions he has drawn, may be otherwise and more satisfactorily explained, in these two instances, less reliance can be placed in the truth of his views, applied to many other of the objects enumerated in his list. With regard, however, to one item contained in it, and that the last, we cannot, before proceeding further, refrain from adverting to the most extraordinary supposition as to the mode of formation of the spider's web. Is it possible that Dr. B. can be understood to say, that the spider's web is wound up within its body like a ball of twine, and unwound as occasion may require?

The first section of Dr. Barry's paper refers to "the formation of a flat filament within the blood corpuscle;" and as his theory of the formation of almost all animal tissues, and especially of muscular fibre, depends upon this, it would appear to demand our chief attention.

In the wood-cut here adjoined, are figures of blood-corpuscles in various stages of alteration. The three uppermost figures to the right hand, and lettered *c, c, c*, are copied from Dr. Barry's figures in the Philosophical Transactions, and are given by him as instances of the formation of



a filament, "frequently annular, and sometimes having the ring divided at a certain part," which filament is stated "to be composed of the discs contained within the blood-corpuscle." Now, that the margin of a blood-disc, when shrunk by exosmosis, or altered in form by the granulation of its contained fluid, will assume a crenate appearance in whole or in part, is well known; and it is equally well known, that under certain circumstances, the discs become contracted into the form of a cup.* The other figures are intended to show the appearances presented by the majority of the blood-discs contained in fluid ejected by a man from the stomach; and the alteration of form presented by these blood-discs, would seem to throw great light upon the apparently annular formation given in Dr. Barry's figures. Fig. *e* is that of an unaltered

* This appearance is described by M. Gulliver, Append. to Gerber's Anatomy:—

"They are often swollen at the edges, which in consequence project towards the

blood-disc, having the natural, flattened, concave aspect, with the margins of course thicker than the centre; and it will be observed, that the diameter of this disc is greater than that of any of the other more or less annular ones. It is very clear, that the change of size and appearance in the latter, is entirely owing to an alteration in the shape of the blood-discs, which have assumed the form of a cup, or rather saucer, the prominent edges of which, by their greater refractive power, owing to their greater perpendicular depth, necessarily appear as a bright ring around a darker area. That this is really the case, is proved also by the side-view of the same or similarly altered blood-discs, which are represented by the three crescentic figures (without letters), between the horns of which the faint shadow of the distant edge of the cup could be distinguished by careful adjustment of the light. Now the resemblance of these rings and crescents, with those figured by Dr. Barry, is sufficiently obvious, to render it needless to insist upon the conclusion, that in all probability the appearances are dependant in each on the same cause, viz., a contraction into a cup-like form of the naturally flattened biconcave blood-disc; the apparent diameter of which is necessarily lessened in proportion to the contraction.*

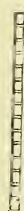
But, if it should really be the case, that the supposed rings formed by the blood-discs are in fact nothing more than the turned up edges of those discs which have assumed a cup-like form: this circumstance alone, would involve an important part of Dr. Barry's views with regard to the primitive formation of muscular fibre. In a former paper in the *Philosophical Transactions*, 1840, Part II., p. 605, he describes the formation of muscular fibre, as observed by him to take place from blood-corpuscles, mixed with mucus expressed from the Fallopian tube of a rabbit (an extraordinary situation, at all events, for the generation of muscle); and in his recent paper in the *Philosophical Transactions*, 1842, Part I., p. 98, and fig. 48, he represents, what he conceives to be the mode of formation of muscular fibre from discs, which, "like their progenitors the corpuscles of the blood, become rings, which rings pass into coils, and the coils unite, thus forming spirals." If, however, it is the case, as we are strongly inclined to believe, that these so-called rings are themselves non-existent, but the creatures of misinterpreted

centre, thus producing there triangular, oval, or irregular depressions. The cup-shaped variety is rather frequent in corpuscles which have been mixed a little while with saline solutions; and it is not uncommon in man, particularly among the particles of purulent or other morbid fluids."

* It is hardly necessary to remark, that all blood discs, even in the natural state, can easily be made to appear, erroneously, as rings, or with a dark nucleus, by varying the adjustment of the eclairage and the quantity of light.

appearance—the first links of this intricate chain will be wanting, and the ingenious superstructure, without cohesion.

Dr. Barry is of opinion, that muscle is nothing more than a “vast bundle of spirals;” and that the muscular fibres and ultimate fibrillæ, are all composed in a similar way, of various sized, interlaced, double spirals; and it is here that we would recall his remark, as given above, relative to the *oblique* direction of the line separating the apparent segments in the small filaments, in connection with the oblique direction of the spaces between the curves of the spiral threads in his larger figure. For if it can be shown, as it readily can be, that the transverse lines, though comparatively some distance apart in the ultimate muscular fibrillæ, of the salmon for instance, are strictly transverse, and circumscribe truly rectangular spaces, as represented rudely in this figure, and that the most careful adjustment of focus, will not show any diagonal lines connecting these transverse ones, how can such an appearance be explained upon the double spiral principle?



The same argument, perhaps, will not hold with regard to the transverse striæ of a whole muscular fibre, as it would be difficult to ascertain accurately whether they were or were not more or less oblique, as in fact they often are, not, in our opinion, from their being portions of a spiral, but owing to other causes, such as more or less irregularity in the degree of contraction of the ultimate fibrillæ, on different sides of the fasciculus, by the allocation of the constituent particles, of which fibrillæ the transverse striæ are formed; or by the mechanical traction of them, in the preparation of the tissue for microscopical examination; or in the pressure to which it may be subjected between the glasses.

Any one of these causes (or perhaps others might be assigned), are sufficient to produce more or less obliquity in the direction of the transverse triæ on the muscular fasciculus; and the two latter would suffice to produce the same obliquity in the transverse lines of an ultimate fibrilla, where such obliquity, as it often happens, is observable. We have not alluded at present to the existence of a spiral filament (not Dr. Barry's), in or upon the sarcolemma of the muscular fasciculi, of which an excellent observer of our acquaintance, is, we believe, satisfied, as the consideration of it is remote from our present object. Some obscurities, perhaps, still hang over the structure of muscle; but, in Mr. Bowman's views on this subject we most fully concur, believing that they represent, as nearly as our present means of microscopic observation will allow, the truth in this *vexata questio*.

XXXVII.—MICROSCOPICAL OBSERVATIONS ON THE PATHOLOGICAL MORPHOLOGY OF SOME OF THE ANIMAL FLUIDS, BY DAVID GRUBY, M.D.—
No. 3.

Translated from the Latin by S. J. Goodfellow, M.D., &c.

[Continued from page 237.]

OF LOBULAR INFLAMMATION OF THE PLACENTA.

THE yellowish-white, hard, friable and fragile substances which occur in the human placenta, occupy a place towards the margin, or on the foetal surface around the larger vessels. They have a thickness of half a line and more, but an extent of 2 — 4 lines.

Microscopical investigation teaches us, that these substances are composed of the larger molecules, also of globules, scarcely exceeding in size the blood-discs, having a smooth envelope, and made up very small molecules.—Plate 10, fig. 80.*

GENERAL SUMMARY.

It is manifest from what has been said, that in every inflammation, whether acute or chronic, suppurative or adhesive, and whether occurring on the surface of membranous or in the substance of parenchymatous organs, either injured or uninjured, globules are formed—which, in inflammation of mucous membranes, being united to the fluid peculiar to those membranes, namely mucus, constitute purulent and puriform mucus, and crude or concocted catarrhal sputa; in inflammation of serous membranes, joined to their peculiar product, viz., serum, they constitute at one time turbid serum, and at another a puriform fluid, or purulent exudation; in cutaneous inflammations they constitute the contents of vesicles or pustules; in suppurative inflammation, united to a pellucid fluid they constitute pus; in adhesive inflammation, and in that of croup, joined to the plastic lymph, they form the false membrane of croup or a varnish-like exudation; in parenchymatous inflammation, united with plastic lymph, they constitute the inflammatory tumefaction; joined with a serous fluid, and filling up minute interstices, they appear as purulent infiltration; and when collected in larger recently formed cavities, they form the contents of abscesses.

Hence the products of inflammation—

1st. Differ according to the different medium with which the glo-

* The tables, shewing the characteristic properties of the different fluids treated of, will be inserted in our next number.—E. M. J.

bules, generated by inflammation, appear mixed ; globules, for example, united to mucus, forms catarrhal purulent mucus, &c. ; united to serum, purulent serum, &c. ; united to a white fluid, pus ; mixed with plastic lymph, plastic exudation, or purulent plastic exudation.

The medium with which the globules formed by inflammation appear mixed, then depends (A), upon the organization of the substratum of the pathological process. As long as the texture of the substratum shall not have been destroyed, even so long will there be a special character given to the product of inflammation, which depends upon the special character of the substratum, and not upon any peculiarity of the pathological process. But as soon as the texture of the substratum of the pathological process shall have been entirely destroyed, then the pathological product of the inflammation loses its special character ; thus, for example, in inflamed mucous membrane, there is remarked a product of inflammation of a peculiar character, and purulent or puriform mucus is generated, as long as this membrane shall keep its peculiar and characteristic organization, which, being lost, the pathological product is equally deprived of its special character, and in place of puriform or purulent mucus, pus is generated. Hence it is manifest, that the essential difference between pus and mucus is to be sought, not in the globules, but rather in the fluid with which the globules appear mixed. There are not wanting chemical re-agents, by which a clear and distinct difference is evinced by which the product of inflammation of a mucous membrane, whose texture is not altogether destroyed, is distinguished from the product of that membrane whose continuity is injured or organization destroyed ; for, in the destroyed part, the globules of inflammation no longer appear mixed with a medium distinguished by a special character.

The product of an inflammation, for example, from a suppurating wound of the mucous membrane of the lips of the mouth, is then in no ways distinguishable from the product of inflammation of a suppurating wound of the skin ; but the product of an inflammation of the mucous membrane of the lips, its continuity being uninjured, is distinguished from it in the former case ; for the globules of inflammation in the former case, joined to some limpid fluid, compose pus ; but the globules in the latter case, mixed with the so-called proper mucus, do not form pus, but puriform or purulent mucus, to be distinguished by re-agents, as long as the organization of this inflamed patch shall not altogether have been destroyed.

Since the so-called globules of pus generated in every inflammation of mucous membranes are not to be distinguished from each other, whether the continuity be injured or not, which, although even formed from a mucous membrane whose continuity is injured, mixed with some

limpid fluid, compose the pathological fluid called pus, however then, at least, it can be distinguished by re-agents, while this pathological product, freed from all proper mucus, may be submitted to examination, which then, at least, can be done, provided that access to the pathological substratum is easily attained, as in the mucous membrane of the tongue, of the lips, palate, cheeks, nostrils, vagina, neck of the womb, nymphæ, anterior part of the urethra, inferior part of the rectum, conjunctivæ of the palpebræ and of the globe; but the product of inflammation formed from a breach of continuity of the mucous membrane in remoter parts, is almost always intimately mixed with the product of an inflamed and irritated adjacent mucous membrane, and in no manner is it discharged separate; thence the result of the examination of these mixed products is doubtful. Here we number the product of inflammation from breach of continuity of the mucous membrane of the pharynx, œsophagus, and whole alimentary canal, even to the inferior portion of the rectum, moreover that of all the air passages, ureters, urinary bladder, urethra, even to the scaphoid fossa, fallopian tubes, and cavity of the uterus, Eustachian tubes, and its propagations, sinuses, and different ducts, except a great part of the mucous membrane may have been destroyed; for then, from the great quantity of pus prevailing, there is not found sufficient mucus. Hence, pus nearly pure is thrown out, as is wont to occur in phthisical patients affected with large vomicæ of the lungs.

Not only the substratum, but also (B), the different intensity of the process of inflammation produces various media, with which globules of inflammation appear mixed; thus an irritated serous membrane generates a few globules united with a large quantity of aqueous fluid, and forms turbid serous fluid.

But a more intense inflammation of a serous membrane equally occasions a few globules, which united to plastic lymph, form intestinal adhesions. The same occurs in a mucous membrane; a slight irritation or inflammation produces globules united to mucus, but a more intense inflammation generates globules united to plastic lymph, and causes the exudation of croup, a degree of inflammation, which, when it occurs in the parenchyma of organs, produces indurations, hepatizations, and inflammatory tumours.

In suppurating wounds the same pathological product is distinguished by the name of granulations, and in simple recent wounds, by that of varnish or plastic lymph, by which the lips of wounds are quickly united, when they heal by what surgeons term "the first intention."

2nd. Pus of normal inflammation *differs according to the different duration of the pathological process*; for the globules, the inflammation commencing, in a relation to the medium with which they are mixed,

are few in number. They are white, composed of an envelope and the smaller molecules, at least usually, so that the pus is more fluid and white. The globules sensibly multiply, and are remarked of a white-yellow, or yellow colour, with an envelope, and smaller or larger molecules, and also a white central vesicle. The envelope swells in water, and is easily broken; but the molecules, with the central vesicles, being expelled, are firmly joined together. By a law of attraction, and at this time, the pus is rendered thicker and of a deeper yellow. In this way can be explained the reason why pellucid lymph taken from variolous vesicles, produces the effect of inoculation of the variolous contagion more surely than the turbid or purulent serum of the pustules; because the envelopes of the globules in the latter case being very quickly broken, the globules lose the power of generation and fecundation.

Pus of the most advanced stage of inflammation contains globules destitute of envelope, and lacerated; and if the secreting pathological organ shall have been open, they are intermixed with epithelium.

3rd. The product of a specific inflammation differs from the product of a normal inflammation; thus, in tuberculous inflammation of the lungs, peculiar lenticular bodies concentrically striated, occur which are six times larger than the globules of pus. In the variolous process, conoid or cylindrical animalcules, exercising a circular motion, are intermixed with the pus globules.

4th. Globules formed from irritation or inflammation of mucous and serous membranes, their continuity being uninjured, have usually a larger diameter than those of abscesses and wounds treated by dry remedies, on account of the prevailing abundance of serum, in which the globules swell as if in water.

5th. Pus, purulent serum, pathological mucus, pathological lymph, as well fluid as thick, are composed, like the blood, of globules and a fluid; the globules and the fluid differ as much also in quantity and quality. The quantity of the globules determines the colour and density of the pus. The form of the globules is different; most of them are round, some are elliptic, oblong, many cylindrical. Their magnitude is equally different; the smallest equal, the largest are eight times the diameter of that of the blood-globules. The colour of the globules is white or yellow, some are almost pellucid, others transparent. Globules of pus are provided with a very thin envelope; some, however, are destitute of it. Some are filled with very small molecules, but others with larger ones. The central vesicle is not met with in all, but some are endowed with two or three. In some the central vesicle is filled with the smallest molecules, in most of them the central vesicle is destitute of all molecules.

The fluid in which the globules are suspended, is either pellucid or diaphanous, at one time thicker, at another time less thick, or is quite as liquid as serum. In nitric acid and nitrate of silver solution, it is sometimes converted into yellowish-white shreds.

6th. As yet no material and specific difference has been observed between the product of ophthalmoblennorrhœa and phalloblennorrhœa, and the product of normal inflammation of other membranes.

In what manner does the Absorption of Pus take place ?

The globules of the mature pus are broken, but the smallest molecules, being scattered about, are easily seen to permeate the coat of the intermediate or capillary vessels, and to be mixed for a certain time with the blood, until they are deposited in a fit place (an excreting organ), for ulterior elimination, or into some organic non-excreting texture, and accumulated, are at length transformed into globules of pus, destitute of all covering, and at first form metastatic infiltration of pus, or purulent metastatic exudation (for example, Pyo-ophthalmum parturientium), more slowly metastatic abscess. Afterwards by a vital re-action, an inflammation arises around the metastatic infiltration; new globules of pus, endowed with an envelope, molecules, and a central vesicle shortly arise; so that even here and there, in a *metastatic* abscess, globules of pus, provided with an envelope, are to be detected.

In phlebitis or arteritis, *entire* globules of pus mixed immediately with the blood, and joined to it, are carried about in the sanguiferous vessels, until, from their larger diameter, the free passage through the intermediate vessels is interrupted; which taking place, the circulation of the blood-particles becomes impeded or retarded, and the stagnating blood separates into its constituent parts, as if it were out of the organism; the serum and the plastic lymph transude, the intermediate vessel is obliterated, and, we believe, in such manner is brought about that small inflammation, which, in lobulated organs, they call lobular hepatization or inflammation.*

But not in every organ does a globule of pus, interrupting the passage of the intermediate vessels, provoke or occasion stagnation of the blood, for as—

1st. The parietes of vessels shall be surrounded by a firm and elastic texture, then either the globule is driven onwards, or the dilatation of

* Although this may be one cause of lobular inflammation, there are unquestionably others.—*Translator*.

adjacent intermediate vessels is interdicted; hence metastatic inflammation in organs, endowed with fibres, occurs very rarely. Among these we number fibrous organs, as tendinous fibres, muscular fibre, nervous fibre, compact neurilemma, and osseous fibre, also organs endowed with an erectile tissue, as the glans and corpora cavernosa of the penis, and clitoris, the papillæ of the breast, and also the parietes of the arteries.

2nd. Moreover, hard glandular organs, as the prostate, virile, mamma, testicles, ovaries, womb, liver, kidneys, thyroid gland, the parenchyma of the spinal marrow and brain, the skin of the sole of the foot, of the palm of the hand and of the back. The less the resistance offered by the surrounding tissues to an intermediate vessel obstructed by a globule of pus, by so much the more difficult is the onward progress of that globule rendered; the greater the dilation the quicker and more frequent does metastatic deposition occur. Here we number soft, subcutaneous cellular tissue surrounding muscles, nerves, and salivary glands; the cellular tissue of the female breasts, orbit, &c.; vascular membranes, as that of the brain and spine, iris; synovial organs of the joints; soft parenchymatous organs, as the lungs, spleen, mucous membrane, and the skin, where it offers a soft, weak texture, as that of the eyelids, ears, pudenda of women, &c.

Pus received into the veins passes very rapidly by the pulmonary artery into the intermediate vessels of the lungs, where it chiefly produces metastatic lobular stagnations and inflammations.

But pus in the arteries is carried around to those organs chiefly to which the greater quantity of arterial blood is borne, or to which in the normal state the excretion of heterogenous substances, mixed with the blood, takes place, (brain and kidneys.)

3rd. The organs whose intermediate vessels are endowed with a large or too narrow diameter, seem unfit for metastatic depositions, as, for example,* the intermediate vessels of the corpora cavernosa, penis, are endowed with the largest diameters = $\frac{40.65}{10.000}$ of a Vienna inch; on the contrary, the smallest diameters of intermediate vessels are found in the tendons = $\frac{1}{107.000}$ of a Vienna inch.

In the same manner as the stagnation of the blood precedes exudation and hepatization in lobular inflammation, so in every inflammation of any substratum, of any extent, from whatever cause arising, the local stagnation, or at least the impeded and retarded propulsion of the

* According to the observations of the celebrated and excellent anatomist Berres.

the blood in any circumscribed place, we observe to precede exudation and hepatization. An inflammatory tumour from exudated plastic lymph takes place, redness from the dilated passage of the adjacent intermediate vessels, in which there is contained a greater abundance of blood which regurgitates from some obliterated intermediate vessels; pulsation in the inflamed texture then presents itself, whenever a new wave of blood is impelled towards the obliterated intermediate vessels, and hence arises also the dilatation of the adjacent intermediate vessels.* The impediments of the circulation in the intermediate vessels sensibly retard also the circulation in the capillary vessels resisting the expansion, until either they overcome the obstacle, or their tonicity being weakened, they also suffer dilatation; and in the same manner the smaller and larger vessels, and lastly the heart itself, on account of the impediment of the circulation, produces more vehement and quicker expulsions of blood, exciting an universal fever. Hence, or in this way is explained the diversity of the pulse, the pectoral pulse in pneumonia, because the left heart impels the blood into the aorta without any obstacle; the cephalic pulse, if the obstacle is in the circulation of the carotids, in a direct line impeding the expulsion of the blood; and the abdominal pulse, if the obstacle of the circuit of the blood has extended much into the mesenteric vessels, it flows back into the abdominal aorta, and thus is the impediment of expulsion placed in the left heart itself. It is thus that the free pulse, after venesection, is to be explained.

The liquor sanguinis quickly transudes the walls of the intermediate vessels, quickly rendered thin by dilatation; it separates into serum and plastic lymph; the plastic lymph, again, forms into molecules and soft fibrils, forming, by an organic molecular attraction, globules which we find enclosed between the fibres. Hence an inflammatory boundary—

1. From the texture of the pathological substratum.
2. ——— obliterated intermediate vessels.

* It may be here stated, that the author's description of the smaller vessels is in accordance with the arrangement of Berres. Berres divides the vessels running between the larger arteries and veins (proceeding in the order of the circulation), into arterial capillaries, intermediate vessels (capillaries of English anatomists), of equal diameter throughout their course, and venous capillaries. Most English, and French, and even German writers, on the contrary, call all vessels which gradually decrease in size, arteries or veins, according to whichever system they belong; while they confine the term capillaries to those intermediate vessels whose diameter is the same throughout their course.—*Translator.*

3. From the dilated intermediate and capillary vessels.
4. ——— recently formed soft fibrils.
5. ——— globules of pus, of inflammation.
6. ——— smaller molecules, here and there dispersed.
7. ——— small quantity of serum, with which we see the textures kept moist.

The exudation is changed in direct relation with the obliteration and dilatation of the intermediate and capillary vessels ; and in the same manner as the obliteration proceeds from the centre of the inflammation to the periphery, so the whole process of inflammation is propagated from the centre (focus) towards the periphery. But if the cause exciting the inflammation, is more intense, it acts by destroying the normal texture ; globules, mixed with serum, then form a peculiar fluid, named pus, in the limits of the injured organs, which flows together from its different parts, and either remains for a long time enclosed in a pathological cavity (abscess), or flows out from a pathological surface (wound) ; but the pathological fibrils, which, creeping over, constitute the granulations for the new intermediate vessels, are fixed to the parietes, until the pathological surface (wound) shall have ceased to exist. Hence the normal inflammatory process everywhere offers to us the same products, which differ as to the quantity and external form, but not as to quality and internal composition ; for the inflammatory tumour and boundary of the *adhesive* inflammation is constructed of the same constituent parts as the true inflammatory boundary of *suppurative* inflammation. But in considering a pure, recent, incised wound, where all the parts are not only organically disturbed, but their texture and cohesion (the causes of all organic formations), in part of the incision are destroyed and removed, the suppurative inflammation will only be excited when the pathological surface shall not have been brought together by the aid of a suture or ligature ; but if anything shall have brought the pathological surface of the lips of the wound in contact, then the adhesive inflammation will certainly be produced.

In the reported case, the mischievous power and the same lesion then may produce *suppurative* inflammation, if the pathological surface continue exposed, and the *adhesive* inflammation, if you shall have brought it together.

In a pure, suppurating, fistulous wound, pus is generated by the suppurative inflammation, as long as the pathological surface continues exposed or open ; but, being brought together, (for example, by proper compression), the adhesive inflammation arises, and pus is no longer formed.

A contusion, like any other mischievous power sufficient to destroy the texture of the different soft organic parts; for instance, if it shall have destroyed the sub-cutaneous cellular tissue, will produce abscess; because the cellular tissue is destroyed, that is, its continuity has suffered to its smallest particles, so that it shall have been changed into a pulaceous mass; it then continues shut up by the pathological surface, which being brought together, for example, by proper compression, no pus and no abscess is formed, but the adhesive inflammation arises. But the recently destroyed cellular tissue, like every other organic substance, is delivered up to the circulation by absorption. When, however, on account of the situation of the pathological surface, or its rigid and firm texture, the bringing together of it is impossible, for example, in inflammation of the lungs, or the medulla of the bones, then suppuration only takes place.

How is it explained, that the same situation of the same pathological process, produces at first Suppurative Inflammation, afterwards Adhesive Inflammation, according as a pathological surface shall have been present or absent?

As we understand the material pathological changes of inflammation, it behoves us to make plain the special cause or end of inflammation. The continuity of the skin and healthy cellular tissue being destroyed by a scalpel, the hidden openings of the intermediate and capillary vessels, and of the smaller vessels, pour out blood, until the capacities or diameters of the divided vessels become obliterated, partly by of the continuous energetic tone, and partly on account of the coagulation of blood stagnating next the orifices, by which a compress (trombus) in some larger vessel, and a stagnation of the blood-particles in the openings of capillary and intermediate vessels arise. The dropping of blood being stopped, a yellowish reddish-white, then yellowish-white, and at length a white pellucid fluid flows in small quantity from the wound, which is composed of a few blood-globules, and the larger globules of pus suspended in the liquor sanguinis. The opening being obliterated, the wave of blood is driven, without interruption, against the compress (trombum), the parietes of the smallest vessels are not long able to resist this action; hence the diameters of the intermediate vessels immediately adjacent to the obliteration are dilated, their parietes rendered thinner, and by reason of the diminished tone, the blood is ultimately moved with difficulty; the circulation in the dilated vessels is retarded

on account of the greater quantity of blood with which the dilated vessels are filled, and on account of the more manifest retardation the greater quantity of the *liquor sanguinis* transudes. This divides into serum and plastic lymph; the latter divides again into soft fibrils and the smallest molecules, which unite by attraction, and form globules, which are enclosed among the fibrils. The texture thus appearing red, on account of the dilatation of the smallest vessels, indurated and tumid from the great exudation and the larger quantity of blood in it, more hot from the rapid decomposition of the liquor sanguinis, and the quick transition of the fluid liquor into solid substance, painful from the compression of the adjacent nerves, is said to be *inflamed*.

The liquor sanguinis is deposited around the attenuated parietes of the vessels; that part of the parietes of the intermediate vessels next the wound is more quickly and extensively dilated than the other part of the wall of the vessels, which is as yet joined to, or in contact with, the adjacent texture. On this account the transudation of the liquor sanguinis is more easy and more copious in that free part of the wall to which *no* texture is opposed than in the other.

The more copious liquor transuding on the free surface from the vessels, even so as to fill the interstices of the texture, divides into serum and plastic lymph; the plastic lymph again forms soft fibrils, which adhere firmly, like glue, to the parietes, and the smallest molecules, which, in obedience to a physical attraction, form globules united with the serum; these two constituent parts form yellowish-white, yellowish-green white, limpid or turbid, thick or thin fluid, called at one time purulent fluid, at another puriform serum, purulent serum or pus.

The accumulated soft fibrils intermixed here and there with globules of pus, constitute the coagulating lymph or cement (vernix) of surgeons, by which the lips of a clean, recent wound are agglutinated together. What has been said concerning an open, suppurating surface, may be said of a shut suppurating surface, or an abscess.

The more the parietes of the minute vessels are extended, the more porous they become; by the continual transuding liquor, the pores become sensibly dilated; and where the fibrils of exudation shall have increased into the form of granulation, the liquor provides little rivulets for itself, which, from the liquor continually transuding, are sensibly rendered so large as to allow a globule of blood to permeate them; but when they decussate among themselves, the globule is easily repelled again into the mass of the blood, and in such way new intermediate capillary vessels are formed between the recently formed fibrils.

But if the lips of a wound shall have been united by suture or ligature, so that the pressure of the lips touching each other, shall at least be such that it may be equal to that of the adjacent healthy texture, then the parietes of the vessels observed on the pathological surface, find as equable a resistance as the other parietes of the vessels; hence an equable dilatation will have an equable exudation; and the globules of pus enclosed between the fibrils of plastic lymph, will remain as long as in every inflammatory boundary, viz., until they shall have been removed by absorption. Hence no pus is collected, and the lips of the wound glued together, are afterwards joined by new rivulets, and then by intermediate vessels.

Therefore a pathological surface is the primary condition, and is in the highest degree necessary for engendering the process of suppuration; on the other hand, the removal of the pathological surface, is the one principal prop for preventing or impeding the suppurating process.

Hence is manifest :—

1. The value of proper compression in the treatment of inflammation.
2. The utility of blood-letting.
3. The utility of the application of cold.
4. The necessity of obliterating the minute vessels, for the production and sustaining of inflammation.
5. The necessity of continued inflammation for the recovery of injuries.
6. The utility of all irritating and stimulating remedies, even of those destroying the organic texture, for the obliterating of the intermediate vessels for this purpose, that the dilatation of their walls, and the retarded circulation of the accumulated blood, exudation of plastic lymph, formation of vessels and of new solid substance shall follow. In a word, that inflammation, where the process of inflammation is either insufficient, or shall have been entirely extinguished, may be sustained, or re-excited.

The Translator thinks it proper to state, that he is in nowise answerable for Dr. Gruby's opinions. He leaves them entirely in the hands of the reader, without giving any opinion of his own as to their correctness or otherwise; but he thinks that, to any gentleman who can spare the time and have the opportunities, the various subjects alluded to by Dr. Gruby, offer a very fruitful and important field for observation and study.

Extracts and Abstracts from Foreign Journals.

[From the *Reports of the Berlin Academy*, 1842.]

Müller and Retzius' Anatomico-pathological observations upon certain Parasitic Growths.—When engaged in the dissection of various marine animals, in the month of August, M. M. Müller and Retzius examined a haddock with a slender tail, and which, according to the fishermen, was diseased, and consequently unfit for food.

The disease was seated in the air-bladder, which contained a large quantity of a yellowish, greasy, inodorous substance. Under the microscope this substance proved to be very peculiar, containing corpuscles about 0.00058—0.00068" long, and which resembled in form a smooth *Navicula* or the *Frustulia coffeiformis* of Agardh. They were constituted of two scales, connected by a granular matter. The corpuscles were at first closed, but afterwards opened longitudinally, being held together by the granular matter, and finally became separated. They were formed in cells, each of which contained several individuals. By this circumstance, and by the want of silica in the shell, these bodies are clearly distinguished from *Naviculæ* and similar Infusoria. They would appear to be more properly arranged together with the Psorospermia of fishes, in a distinct division of parasitic, merely vegetating, organic growths of specific structure,

The authors had also made further observations on the development of mould in the lungs and air passages of birds. These observations do not refer to the mould described by Mayer, Jäger, Heusinger, Theile, and more lately by M. Deslongchamps, as found in the lungs of birds soon after death, but to a fungoid growth, consisting of flattened masses of a firm and remarkably tough substance. This growth was noticed by M. Deslongchamps, as forming the substratum of the filamentous mouldiness discovered by him in the lungs and air passages of an Eider duck, which was sick and affected in its breathing; but its real nature, as it would appear, was overlooked by him, since he mistook this vegetation for an albuminous exudation. The fungoid masses have been observed, once in Stockholm and once in Berlin, under circumstances altogether alike. The former instance was that of a *Stryx nyctea*, which had been brought from Lapland, and had lived part of the winter in Stockholm, but was always unwell and short breathed. The dissection was made by Prof. Retzius, and the preparation has been for a long time in the Anatomical Museum at Stockholm. The lungs and thoracic cavities were found to be universally covered with mushroom-like, flat-rounded bodies of yellowish-white colour, slightly depressed in the centre (or cup-like), and having their surface marked with concentric rings; they were of various sizes, from very small to that of a diameter of 1 or 2 lines or more. They were very closely attached, but could be detached without injury to the mucous membrane. Several neighbouring patches ran together, and had their

outer rings in common. In two places the air-passages were covered to the thickness of 1 to $1\frac{1}{2}$ lines, with these confluent bodies, which thus constituted a continuous layer of almost cartilaginous consistence. The second instance, in which a similar occurrence was observed, is that of a *Falco rufus*, which was brought to the Zoological Museum of Berlin, having been shot two years before. In this case, M. Dubois discovered the white, cup-shaped, flattened bodies, quite fresh, in the air-cavities, and also in the abdominal cavity in the neighbourhood of the kidneys, the surface of which presented many of them.

M. Müller was at first unable to recognize any structure in these bodies; but, upon further microscopic examination, some degree of structure or organization was evident in all of them, though not always very readily made out; in numerous instances, by fortunate sections, very transparent, delicate, branched filaments were observable in amorphous substance. These filaments were so evidently of vegetable nature, that no one who saw them had any doubt on the matter; they appeared such to MM. Link and Klotzsch. There were, however, other more irregular and much thicker filaments of more doubtful nature, which were scattered about, and distinguished by their protuberant margins; these filaments were also occasionally seen to be agglomerated into distinct, rounded masses.

The vegetable nature of these patches cannot be doubted. The filaments of the mould growing upon these patches, bear no resemblance to the filaments *within* the patch; they are thicker and evidently jointed, as was observed by M. Deslongchamps, and are all frequently furnished with capitate, sporiferous bulbs. This mould is evidently an *Aspergillus*.

Organs of fructification have not been met with in the mushroom-like bodies, which, consequently, in this respect approach the doubtful *Sclerotia*; but direct observation of the latter, as *Sclerotium semen, complanatum*, does not show any close resemblance; still less similarity is observable in the structure of *Dacryomyces stillatus*.

[From Müller's Archives.]

Simon on an Acarus inhabiting Diseased and Healthy Hair-follicles of Man.—In reference to the nature of acne, the inquiry may be made, Whether the pustules constituting this eruption, arise from disease of any of the special organs present in the skin, such as the sebaceous and hair-follicles; or whether they arise from inflammation and suppuration in the fibrous tissue of the skin itself, without preceding morbid affection of any other part of it? I examined, with a view to determine this question, the contents of acne particles opened in living persons; and frequently found, as well in the small pustules, which soon burst, and which have been termed acne simplex; as in the larger ones (formed by more or less reddened indurations of the skin), of acne indurata, besides pus, small, elongated, whitish-looking bodies. When brought under the microscope, I always found in these a hair, which was sur-

rounded by the whitish body. The figure of this body, as well as the relation it bore to the hair, placed it beyond doubt that it was a hair-follicle; and it differed from a normal hair-follicle only in the circumstance, that it was much more delicate, and appeared as if it had been macerated, so that by moderate traction it was readily divided into several portions. Sometimes, also, I observed parts of sebaceous follicles in connection with the sac. In smaller acne pustules I found commonly only one hair-follicle, but in the larger, several. Similar whitish bodies were not observable in the matter expressed from the acne pustules; and I after remarked, when the whole of the contents were brought under the microscope, among them one or more hairs, which were sometimes entwined together, or rolled up in a spiral form.

Although these facts rendered it probable that acne originates in an affection of the hair-follicles, still, on the other hand, there was reason to suppose, that the inflammation which gave rise to the pustule, commenced in the true tissue of the cutis: and that by the occurrence of the suppuration, the connection of the hair-follicles with the skin was destroyed and thrown off when the pustule burst.

One of the morbid affections of the skin, differing from the pustules of acne, appeared to me calculated to throw some light on the subject. There are frequently observable, especially in those who are subjects of acne, black specks on the surface of the skin, which are caused by the accumulation of sebaceous matter in small follicles of the skin, and which are known under the name of maggots (*Comedones Acne punctata*.)

A real pustule of acne is not unfrequently seen to be formed in consequence of inflammation around one or more of these little bodies, and not unfrequently we may recognize also, on pustules of acne, the commencement of which may not have been observed, by the presence of one or more black points, that they also must have arisen in a similar manner. Should this demonstrate that the *Comedones* are in some way altered hair-follicles, the conclusion becomes manifestly more obvious, that the pustules of acne originate in disease of those follicles. According to the opinion of many authors, these maggot-like bodies consist in an abnormal accumulation of sebaceous matter in the fat-secreting glands of the skin, which have been hitherto considered as simple sacs.

These glands, however, open directly on the surface of the skin only on those parts which are entirely without hair, as the glans and nymphæ; in other parts of the body, their orifices are always in connection with hair-follicles: at least this is the result of all late observations, and in my researches on the skin of the face, I have not been able in any case to find a fat follicle independent of this connection. Where such distinct gland has appeared to exist, the total want of orifice, or at least of one reaching the surface of the skin, has shown that the hair-follicle belonging to it had been cut away.

As all this rendered it certain that the little follicles in which the accumulations of sebaceous matter forming the *Comedones* are found, could not be the fat glands; so the following observations proved them to be in reality hair-follicles.

Earlier investigations had informed us, that the little expressed masses consisted of minute vesicles, many of which are filled with sebaceous

matter. I also frequently found the contents of these bodies to be so composed, but besides remarked in numerous instances, one or more hairs in them, which were either scattered about irregularly in the expressed matter, and curved in various directions, or lay together in a parallel direction. This was especially and very frequently observable in large black pointed *Comedones* on the nose. The number of hairs thus formed, in some cases, was extraordinarily great, occasionally amounting to above forty. The hairs contained in the large nasal *Comedones* had moreover this peculiarity, that they did not terminate in a sharp point, but appeared to be cut off, so as to have a rounded extremity. The examination, also, of the integument in the dead subject, clearly proved the *Comedones* to be morbidly altered hair-follicles. I took some perpendicular sections of the integument of the nose, furnished with many of these bodies, and examined them under the microscope, when they clearly appeared to be sacculi, closed below and opening at the surface of the integument. They all had the form of the hair-follicle, with the exception that they were a little wider than the normal ones, as I proved by comparison with unaltered hair-follicles taken from another body. In the interior of the dilated follicles there was a large accumulation of sebaceous matter, and either one or a great number of hairs. When many hairs were present, no part of the sheath, which naturally surrounds the lower part of the hair within the outer sac, was distinguishable; but the collected hairs appeared to lie loose in the outer sac.

The sebaceous matter could be expressed through the opening of the hair-follicle. Thence it would appear, that the maggot-like bodies are in fact hair-follicles, and that they are occasionally converted into the pustules of acne; and it is very probable, that when the pustules do not thus originate, some disease of the hair-follicles is still their real cause.

Further researches, however, are necessary to render this opinion certain.

But besides the above-mentioned parts, I found in matter from the *Comedones* of living subjects, other bodies, which I did not at first know how to explain. I frequently remarked in them a slender corpuscle about $\frac{1}{10}$ th of a line in length, which was rounded at one end, and at the other, which was rather thicker, appeared to be furnished with short teeth. I at first conceived that the glands of the hair-follicles of the nose were differently constituted to those in other parts of the body, and that by the pressure I had torn away one of these glands with a portion of the follicle attached to it.

Opposed to this view, however, was the circumstance, on the one hand, that the more slender, rounded extremity of this body appeared completely closed; and, on the other, that the thicker, toothed end was always in the same form, which could not well have been the case with detached or torn away portions of a gland. I consequently pursued my examination of these bodies, and was at last convinced that they were animals; and, by using higher magnifying powers, I was able to make out clearly a head, legs, thorax, and abdomen.

This supposition was confirmed, when, on an occasion, in which I

had only moderately compressed the object, under the glass, I perceived motion in it. Since then I have repeated the observation so often, that I am perfectly convinced of its correctness.

I have also shown to many of our naturalists and physicians living specimens, which have been recognized as animals by all who have seen them. As the occurrence of hitherto unknown animalculæ in the human skin, appeared to me a very remarkable circumstance, the objection occurred to me, that these creatures might in some way become mixed with the matter extracted from the *Comedones*, either from the water employed or otherwise. If it true, the animals were invariably, closely enveloped by the fat cells, and became obvious when these were moderately drawn apart. But this did not appear to me altogether sufficient. I freed two perfectly clean slips of glass from all organic particles, by heating them strongly over a spirit-lamp, and extracted, with a needle cleaned in the same way, the contents of a *Comedo* from a living person, and placed them, without admixture of water or anything else, between the glasses, and still found the animalculæ. That these had been situated, not on the outer surface of the skin, but within it, was readily proved, by examination with a lens, which would have shown them, had they been on the surface. Also, when I scraped the surface of the skin with a knife, in persons whose *Comedones* contained animalculæ, and examined the matter thus removed under the microscope, I never found any in it; but these were always first apparent when the contents of the follicles were expressed. Altogether, up to the present time, I have found the animalculæ in three living men, whose ages were respectively 40, 30, and 22 years. All of them were healthy and very clean persons. The *Comedones* were in all three situated on the nose. In seven other living persons, in whom I had examined the contents of the follicles, I was unable to find any of the animalculæ.

Having in the above manner rendered it certain, that a peculiar species of parasite occurs in the integuments of living persons, I proceeded to search for it in that of the dead body. I chose for this purpose six bodies, four of which had very numerous *Comedones* in the nose, the other two but few. I took thin laminæ from the integument of that part, made by perpendicular sections, and in such a way that in each of them, some of the *Comedones* were present. On placing these lamellæ under the microscope, I remarked that the *Comedones*, which were evidently dilated hair-follicles filled with adipose matter, almost all contained animalculæ, many of which were still alive. By compression, I could also, most commonly, express these creatures through the opening of the hair-follicle, together with the sebaceous matter.

The examination of these portions of integument rendered it also clear to me, that many of the apparently normal hair-follicles contained animalculæ. In order to procure a satisfactory view of the width and other particulars of perfectly normal hair-follicle, I took thin slices from the integument of the nose of two bodies, in which there was no appearance of *Comedones*, and submitted them to the microscope, and found also in this instance one or more of the animals in many hair-follicles. I have altogether, up to the present time, examined ten bodies; two of new born infants, one of a child three years old, and seven of adults of both

sexes. In eight of these, six of which had *Comedones*, I found the animalculæ sometimes in unnaturally dilated, and at others in perfectly natural, hair-follicles of the nose and immediately surrounding parts.

I have not hitherto examined the hair-follicles of other parts of the body. The only bodies in which no animalculæ were to be found, were those of the two new-born infants. Dr. Troschel has found them also in the integument of the upper lip of a woman.

They exhibit differences, arising from age. The form which I have most commonly observed is 0.085 — 0.125 of a line long, and perhaps 0.020 of a line broad. The head, which becomes narrower in front, consists of two bodies (the palpi), placed on the sides, and of a proboscis or snout lying between them. The palpi are composed of two joints, of which the posterior is the longer. The anterior and shorter one appears to have small dentations at its free extremity. The snout, which occasionally projects beyond the palpi, and sometimes stands back further than them, resembles a long tube. On the snout there is placed an organ of apparently triangular form, the very short base of which is situated at the posterior part of the snout; but its point hardly reaches quite to the anterior extremity of that part. By using a stronger power, it is seen that these triangular organs, are made up of two spiculæ or bristles lying together. The head is joined immediately to the thorax, which forms about a fourth of the length of the body, and is somewhat wider than the upper part of the abdomen. On each side of the thorax are placed four very short feet, of conical form, the base of which arises from the lateral part of the thorax. Ordinarily these dark, transverse lines are seen on each leg, which appear to indicate the presence of three distinct articulations. A high power, shows at the extremity of each foot, three slender claws, one long and two shorter. These claws are usually pointed, but sometimes appear to be rounded.

Figures corresponding to the above description are added to Dr. Simon's paper, from which the animalcule he describes would appear to be a minute Acaroid. We have examined the contents of the diseased follicles in many subjects, both dead and living, but hitherto without success in finding the animalcule described by Dr. Simon.—E. M. J.

Dr. Vogel on the Existence of Vegetable Parasites in Aphthæ.—Dr. Vogel, like Schoenlein, Gruby, Gibert, and others, has seen vegetable parasites in different diseases of the human body; lately he has found them on the buccal œsophageal mucous membrane of an infant who died of aphthæ, fifteen days after birth. The mouth and œsophagus, as far as the cardia, were covered with an aphthous eruption. On examining this under a microscope of 220 powers, true confervæ, similar to those seen and described by Schoenlein as occurring in impetigo, were distinctly visible. In these parasites, two elementary bodies were recognised: 1st, Small round bodies, with and without a central nucleus. Sometimes these were isolated, and sometimes they were grouped like mould on yeast; they had a diameter of from 1-300th to 1-500th of a

line, were colourless, and not acted upon by water, ammonia, or acetic acid. 2d, Filaments differently arranged, of a slaty colour (*ardoisés*) swollen at different points, either in the middle, or at their extremities. Occasionally they were articulated. Several of them were seen distinctly to take their origin from the round bodies: some of them were more than a line in length, and in general their diameter was about 1-600th of a line. They were likewise unaffected by water, ammonia, or acetic acid.—*Allgemeine Zeitung für Chirurge, &c.*; and *Gazette Med. de Paris, April, 1842*; quoted in *Lond. and Edin. Month. Journ. Med. Science, July, 1842, p. 595*.

Dr. Sharpey on the Membrana Decidua and Uterine Glands.—The uterine glands alluded to in the text have now been ascertained to exist in several orders of mammiferous animals, and from their enlarged size and augmented secretion during pregnancy, as well as the peculiar connexion which is then established between them and the foetal membranes, it has been inferred that they are in some important way subservient to the nutrition of the foetus. The uterine cotyledons of Ruminants were very generally considered to be of a glandular nature by the older anatomists, and as destined to supply a nutrient matter to the foetus; indeed, it had not escaped notice, that these bodies actually yield a mucilaginous secretion. But besides the cotyledons, Malphighi discovered glands opening on all parts of the inner surface of the uterus of those animals, and recognised them as secreting organs. He has described them specially in the gravid uterus of the sheep. (Opp. 1687, vol. ii. p. 220.) At a recent period, the uterine glands of Ruminants were again observed by Baer, who also discovered similar glands in the sow; and although he erroneously supposed they were absorbent vessels, he described them well, and showed that they were connected in a peculiar manner with the ovum; the dilated orifices of the glands being attached to a small vascular spots on the surface of the chorion, which, in the sow, he describes as formed by little circular or star-like elevations of the membrane surrounding a central depression. (Ueber die Gefaessverbindung zwischen Mutter and Frucht, 1821.) This arrangement was justly considered by Dr. E. H. Weber, who afterwards investigated the subject, as a provision for the accumulation of the secreted matter of the glands, and for securing its effectual exposure to the blood-vessels of the foetus. Weber also more fully described the glands in Ruminants, and observed glands of the same nature, though of a different form, in the uterus of the rabbit (*loc. cit.*) Still more lately, uterine glands have been discovered in the pregnant porpoise, by Dr. Eschricht of Copenhagen; and in the gravid uterus of the cat, the same observer found oblong cells lying under the mucous membrane, which he considers to be glandular cavities, though he could not discover their orifices on the inner surface of the membrane. (De organis quæ resp. et nutr. foetus mammal. inserviunt. Hafn. 1837, p. 43.) Having had occasion to observe these glands in the uterus of the bitch, and having examined their condition in various stages of pregnancy, as well

as their relation to the membranes of the fœtus, I beg to subjoin an outline of my observations.

The glands of the mucous membrane of the bitch's uterus are of two kinds, simple and compound. The simple glands, which are the more numerous, are merely very short unbranched tubes closed at one end. The compound glands have a long duct, dividing into convoluted branches; both open on the inner surface of the membrane by small round orifices, lined with epithelium and set closely together. After impregnation, the parts of the mucous membrane which come into immediate relation with the ova, together with the glands seated in those parts, undergo a remarkable alteration. In a uterus between three and four weeks after conception, at which period the dilatations or chambers which contain the ova attained the size of a walnut, we find, on laying open one of the chambers, that the lemon-shaped ovum is surrounded by a broad belt or zone of villi, which rise from the surface of the chorion, and, becoming vascular, take part in the formation of the zonular placenta. Corresponding with this, there is a zonular portion of the inner surface of the uterus, somewhat raised above the rest, and perforated with small pits, into which the fœtal villi are received; and as this part of the membrane enters into the formation of the placenta, and comes away with the ovum at parturition, it is justly regarded as the decidua. The decidua is no new structure, however; it is merely a portion of the mucous membrane become more thick and vascular than the rest, and the pits on its surface, which receive the fœtal villi, are merely the glands already mentioned somewhat enlarged and widened. While, however, the simple glands merely undergo a uniform enlargement, a change takes place in the compound glands of a much more remarkable character. The long excretory ducts of those glands, immediately before they open on the inner surface of the membrane, become dilated into cells, one for each gland, which are filled with a semi-fluid whitish granular secretion, and are lined with epithelium. These cells form a layer beneath the surface of the decidua, and being crowded together, assume a polyhedral form. At the bottom of each, the tubular duct may be seen about to expand into the cell, and the cell again contracts at its orifice.

In a somewhat more advanced stage, the glandular cells enlarge, their orifices expand, and now membranous processes rise from the surface of the ovum and enter the glandular cells, passing a little way beyond the orifices, by the circumference of which they are embraced. These fœtal processes are prolonged from the chorion and its vascular lining or endochorion, and hence contain ramifications of the umbilical vessels. They are for the most part hollow or saccular, at least at first, and some of them present, for a time, a small aperture of communication between their cavity and the general sac of the chorion, or rather of its vascular lining, but this is soon obliterated; ultimately, they come to resemble much the villi in structure, differing only in size and form. As pregnancy advances, the parts described enlarge, the villi become more complex by ramification, the fœtal processes also give off numerous lateral offsets; but their broad flattened tops, which close the mouths of the glandular cells, are smooth and even, and are covered with a prolonga-

tion of the same epithelium which lines the cells. The maternal or decidual vessels are everywhere closely applied to the surface of the villi, and fill up the intervals between them. They also closely embrace the foetal processes, except at their expanded summits, which, as before stated, are in contact with the secretion of the glandular cells. The maternal vessels, in proceeding from the uterus, first ramify on the parietes of the cells, by which they are supported; but as they approach the villi and surface of the ovum, they form an abundant net-work, the branches of which are unsupported by membranous structure, seemingly as if the intermediate tissue of the decidua had disappeared, its vessels alone remaining in the later periods of pregnancy. At parturition, the decidual vessels come away with the ovum; the parietes of the now greatly enlarged glandular cells also separate in great part from the uterus, leaving merely the bottoms with the round openings of the glandular ducts in their centres. After separation of the ovum and placenta, numerous truncated and somewhat shrivelled vessels project from the inner surface of the uterus; they are chiefly veins, and they may be seen for a considerable time after parturition, on those parts of the uterus to which the ova had been attached.

From the description given, then, it follows, that in the placenta of the bitch there is an arrangement by which a matter, secreted from the enlarged glands of the uterus, is brought into proximity with the vessels of the foetus; and seeing that a provision of a similar nature is found in various other instances, it is not improbable that in viviparous animals generally, a matter deposited from the maternal system by means of a glandular apparatus may be absorbed into that of the foetus, and serve for its nutrition; but this is a question which can be determined only after a more extended investigation. As connected with this subject, the source of the well-known green-coloured deposit found at the borders of the placenta of Carnivora would naturally become an object of inquiry; but on this point I cannot as yet speak with certainty.

Dr. Sharpey on the Human Decidua.—These observations on the decidua of the dog led me to examine anew the human decidua, and more especially its relations to the mucous membrane of the uterus; and I shall now briefly state the result, although I find I have been in a great measure anticipated by Weber, as appears from the statement of Professor Müller in the text. It is right to mention, however, that the results were arrived at quite independently of Weber's observations, and, indeed, before the original of the pages of this work in which they are noticed, reached me.

In various instances in which there was reason to believe that impregnation had recently taken place, and in which the ovary contained a recent corpus luteum and the uterus a distinct decidual lining, though no ovum had been discovered, the decidua, in some places one-tenth of an inch thick, seemed obviously to consist of the thickened mucous membrane. Its surface presented a multitude of small round apertures, which, on a verticle section, were seen to belong to the tubular glands of the mucous membrane, elongated and enlarged. These tubes were lined with white epithelium, which rendered them very conspicuous

They were much waved and contorted towards their deep and doubtless closed extremity; and at various parts they appeared to be implanted at some depth in the tissue of the uterus. Whether any of them divided into branches I could not determine. In a specimen belonging to Dr. John Reid, the uterus contained an early ovum, considered as dating little more than fifteen days after conception. The decidua vera was somewhat corrugated on the surface. It had the usual cribriform aspect, and the pits were for the most part wider than in the earlier examples; but the smaller orifices still presented the character of the tubular glands, and others showed an obvious transition between these and the larger ones. On making a section parallel with the surface, it appeared that many of the pits had a comparatively wide cavity, with a narrow orifice. From these and other observations of a similar kind, I was led to conclude that the apertures on the decidua which gave to that membrane its well known cribriform character, however much they may be modified in the latter stages of pregnancy, are originally nothing else than the openings of the glands of the lining membrane of the uterus; and that, as in the bitch, the mucous membrane is really converted into the decidua, and discharged from the uterus at parturition,—an opinion, it may be remarked, adopted on other grounds by various continental physiologists. In a uterus supposed to have been recently impregnated, and in which the vessels had been minutely injected with vermilion, the lining membrane or commencing decidua appeared everywhere pervaded by a network of blood-vessels, in the midst of which the tubular glands were seen, their white epithelium strongly contrasting with the surrounding redness. In more advanced stages the veins of the decidua form large ramifying canals in the substance of the membrane, which freely communicate with the uterine veins. On inflating these venous canals of the decidua with a blow-pipe, the air will frequently pass out at the openings on the surface of the membrane which we have considered as the orifices of the enlarged uterine glands, and it might hence be concluded that there is a natural communication between the two. I am nevertheless disposed to think, that the venous canals and glandular recesses form two separate systems of cavities within the decidua, divided from each other by very thin parietes, which are easily ruptured. I am inclined to adopt this opinion, in consequence of repeated examination, in various ways, of the structure in question, (though I must admit that the result has not been always favourable,) and also from considering that the pits in the decidua appear, as already stated, to be merely the enlarged uterine glands, which, when observed in earlier stages, seem to have the same relation to the surrounding blood-vessels of the decidua as is known to subsist between glands and blood-vessels in general.

An objection to the opinion, that the decidua is merely the altered mucous membrane of the uterus, which will naturally occur, is the difficulty of accounting on that view for the investment of the ovum by the decidua reflexa, which is continuous with the uterine decidua, and is believed by most, though not by all physiologists, to have a similar origin. At the same time, the force of this objection is lessened by the fact, that the decidua reflexa, though continuous with the vera, does

not, usually at least, present the same character as the vera throughout its whole career; for, without laying stress on the differences generally pointed out by authors, I may state, that in various conceptions which I have examined, the decidua reflexa, in a great part of its surface, was destitute of the small orifices which characterise the vera, and that these were confined chiefly, though certainly not entirely, to a zone of the membrane adjoining the angle of reflection, that is, to the part next the decidua vera. Now, if this observation be found to hold good generally, it will not be necessary to suppose that the lining membrane of the uterus is extended over the whole surface of the ovum to form the decidua reflexa; and although I am not prepared on such limited observations to offer a decided opinion, especially on a question of acknowledged difficulty as this is, still, as at least a possible explanation, it might be suggested that the minute ovum, on its entrance into the uterus, is covered with exuded lymph, either entirely or on that part of its surface which does not adhere to the inside of the uterus; that as the ovum enlarges, a circular fold of the altered mucous membrane (decidua) is drawn up upon it, all round its adhering part, enveloping the ovum to a greater or less extent, and afterwards forming the cribriform zonular portion of the decidua reflexa, whilst the remaining thin smooth portion of the latter membrane, which is more distant from the line of reflection, and is destitute of apertures, is formed by an extension of the covering lymph. Or perhaps the following more simple explanation might not be inadmissible: viz. that the minute ovum, on reaching the uterus, becomes imbedded in the substance of the then soft and pulpy mucous membrane, and that in its subsequent enlargement it carries along with it a covering of the membrane, which is expanded into the decidua reflexa.

Are the cells observed in the human decidua, by Dr. Montgomery, identical with the dilated uterine glands? Dr. M. occasionally found them to contain "a milky or chylous fluid," but he does not describe them as opening on the inner surface of the membrane.

In acknowledging the kindness of my friend Dr. John Reid, now Professor of Medicine in St. Andrew's, in freely placing at my disposal some very valuable specimens in his collection, I deem it due also to that gentleman to state, that he had previously observed the tubular structure of the mucous membrane of the uterus, and was led, by an examination of recently impregnated uteri, to infer that one of the earliest changes which occurs after impregnation, was an increased development of the tubular structure, and this he conceived was connected with the formation of the decidua. At the same time, he did not suppose that the mucous membrane was converted into the decidua, but was disposed to think that the decidua was secreted by the tubes of the mucous membrane."—*Note by Dr. Sharpey to Baly's Translation of Müller's Physiology, Lond. and Edin. Month. Journ. Med. and Science, Feb, 1842.*

Bibliographical Notice.

Monographia Anoplurorum Britanniae ; or, an Essay on the British Species of Parasitic Insects, belonging to the Order Anoplura of Leach, with the modern divisions of the Genera according to the views of Leach, Nitzsch, and Burmeister, with highly magnified figures of each Species. By Henry Denny, Curator of the Leeds Philosophical Society, &c., &c. London. G. Bohn. 1842. pp. 262. 26 Plates.

THE present volume is one of that class, which never fails to call forth the admiration of every lover of nature, whether scientific or not, as it cannot do otherwise than show the zeal, assiduity, and attention the author has given to this inconspicuous order of beings, by developing and bringing to light nearly one hundred new species, of whose existence there was not hitherto any decided proof.

The following will show the arrangement adopted in the work, and the number of species described under each genus, with brief characters of the Families and Genera :—

Sub. Class. I. *HEMIMETABOLA*, *Burmeister*.

Order II. *ANOPLURA*, *Leach*.

Synonym.—Aptera, *Linne*.—Antliata, *Fabr*.—Arachnida Parasita, *Latr*.—Rhophotera, *Clairville*.—Rhyncota, *Burmeister*.—Arachnides Acaridiennes, *Lamarck*.

Section I. Haustellata.

Fam. I. *PEDICULIDÆ*, *Leach*.

Synonym.—Hemiptera, epizoica, *Nitzsch*.—Fam. II. Siphunculata, *Latr*.

Essent. Char.—Antennæ of 5 joints, mouth with a fleshy Haustellum.

Nat. Char.—Apterus, parasitical ; mouth consisting of a fleshy tuberculous inarticulate haustellum, armed at the extremity with retractile hooks ; legs scansorial, tibiæ short, thick, armed at the apex on the inner side with a strong tooth, which, together with the large curved tarsus and unguis, forms a claw ; tarsus one-jointed, unguis single ; œsophagus, none ; biliary vessels four, free, equal in length, enlarged towards their extremities. Males with two testicles on each side ; females with five ovaries on each side of the uterus. Coitus exercetur mare femine submisso.—Food the blood of animals.

Artificial Divisions of the Family.

PEDICULIDÆ.	I. Legs of two kinds, anterior ambulatory ; posterior scansorial ; thorax large, not distinctly separated from the abdomen.....	Genus I. PHTHIRIUS, (1 species.)
	II. Legs all scansorial ; thorax large, not distinctly separated from the abdomen ; abdomen of seven segments.....	Genus II. PEDICULUS, (3 species.)
	III. Legs all scansorial ; thorax generally narrower than the abdomen, and distinctly separated ; abdomen of eight or nine segments.....	Genus III. HÆMATOPINUS, (15 species.)

Fam. II. *PHILOPTERIDÆ*, Burmeister.

Synonym.—Orthoptera epizoica, *Nitzsch*.—Nirmidæ, *Leach*.

Essent. Char.—Antennæ filiform, with three or five joints ; maxillary palpi none ; mouth with strong mandibles.

Nat. Char.—Mouth beneath ; maxillæ none ; mandibulæ nearly concealed by the labium ; pro-thorax narrower than the head ; mesothorax none, or hid by the metathorax, which is very large ; abdomen with nine segments ; œsophagus long, unilateral, ending somewhat acutely in the cæcum ; biliary vessels four, free, equal, without any particular enlargement. Males with two testicles on each side ; females with five ovaries on each side of the uterus. Coitus exercetur mare femine submisso hujusque pedes tertios tenente antennis, si hæ sunt cheliformes. Metamorphosis indistinct, perhaps none ?

Artificial Divisions of the Family.

	Genus.	Sub-genus.
PHILOPTERIDÆ.	I. Antennæ 5 jointed ; tarsi, with 2 claws ; <i>parasitic</i> upon birds.....	I. PHILOPTERUS. { I. Docophorus, (59 species.) II. Nirmus, (59 species.) III. Goniocotes, (2 species.) IV. Gonioides, (9 species.) V. Lipeurus, (18 species.) VI. Ornithobius, (3 species.)
	II. Antennæ 3 jointed ; tarsi with 1 claw ; <i>parasitic</i> upon quadrupeds. }	II. TRICHODECTES, (10 species.)

Fam. III. *LIOTHEIDÆ*, *Burmeister*.

Synonym.—Orthoptera pizoica, *Nitzsch*.—Nirmidæ, *Leach*.

Essent. Char.—Antennæ capitate, four jointed; maxillary palpi conspicuous; mouth with strong mandibles.

Nat. Char.—Mouth beneath, very near to the anterior margin; mandibles strong, armed at the end with two teeth; antennæ inserted in a cavity of the lateral margin; thorax of two or three segments; prothorax with the lateral margins protruding more or less, nearly the width of the head; mesothorax generally small, in some cases as wide as the head; metathorax large, the width of the abdomen; abdomen with nine or ten segments; œsophagus symmetrical, equal, slightly unilateral; biliary vessels four, free, thickened in the middle. Males with three testicles on each side; females with three ovaries. Coitus exercetur femina mari submissa. Metamorphosis indistinct.

Artificial Divisions of the Family.

Genus.		Sub-genus.	
<i>LIOTHEIDÆ</i> .	I. Tarsi with 2 claws.	I. LIOTHEUM.	I. Colpocephalum, (12 species.)
			II. Menopon, (22 species.)
			III. Nitzschia, (<i>nova</i> , 1 species.)
			IV. Trinoton, (4 species.)
			V. Eureum, (2 species.)
	II. Tarsi with 1 claw.	II. GYROPUS, (2 species.)	VI. Lamobothrium, (5 species.)
			VII. Physostomum (5 species.)

The only new genus which the author has added in the work, occurs in the last family, viz., *NITZSCHIA*. We extract the characters for the sake of reference:—

Sub-genus III. *NITZSCHIA*, *Denny*.

Synonym.—Nitzschia, *Denny's MSS.*—Menopon, *Nitzsch*.

Sub-gen. Char.—Head oblong, triangular, orbital margin sinuated; maxillary palpi large and prominent; antennæ capitate, nearly concealed; prothorax narrow; mesothorax large, very distinct; abdomen oblong; tarsi with large involute pulvilli,

Spec.—Nitzschia Burmeisteri.—*Denny* (Louse of the common Swift.)—Menopon pulicare, *Nitzsch*, *MSS.*

The new species figured and described amount to 93, and the number of the illustrations of the Order 205, with, in most instances, numerous representations of isolated portions of each species.

The work has been got up with great care. With regard to the figures we can speak as to the accuracy of their outline and delicacy of execution.

October 19th, 1842.—J. S. Bowerbank, Esq., in the Chair.

A PAPER was read by William B. Carpenter, M.D., "On the structure of the Animal Basis of the common Egg-shell, and of the Membrane surrounding the Albumen." The author found, on examining the thin membrane surrounding the albumen of the hen's egg (*membrana putaminis*), that it consisted of several laminæ, each lamina being composed of interlacing fibres, between which numerous interspaces are left. On comparing this with a portion of egg-shell decalcified by means of dilute acid, both presented the same structure; but the laminæ were more numerous in the latter. He supposes that the deposit of calcareous matter takes place in the interspaces left by the reticulation of the fibres, and concludes that this fibrous membrane is analogous to the chorion of mammalia. A preparation, showing the identity of the two structures, accompanied the paper. Another paper was also read by Arthur Hill Hassall, Esq., entitled, "An explanation of the Cause of the rapid Decay of many Fruits, more especially of those of the Apple tribe." After some preliminary observations, the author proceeded to state, that on placing a portion of decayed apple under the microscope, he observed vast numbers of ramified filaments, passing in all directions between and around the cells of the parenchyma of the fruit; these filaments were regarded as those of a minute fungus or fungi, which, by insinuating themselves between the cells of the pulp of the fruit, detached them from their connection with each other, destroyed their vitality, and ultimately produced a decomposition of their contents. The author then gives his reasons for supposing the fungi to be the cause, and not the effect of the decay; and concludes by describing the several stages of development of the fungi, and their mode of entrance within the fruit. Specimens of the fungi were exhibited to the Society, after the reading of the paper.

Microscopical Memoranda.

Ehrenberg on the Power of Vision in the Human Eye, &c.—He concludes that there are, putting aside all inorganic bodies, even in the kingdom of organic bodies, whose constituent parts or molecules are generally considered to be the coarsest, magnitudes capable of direct proof, which are in diameter $\frac{1}{16.0400}$ of a line; and others that can be proved indirectly, which may be less than a sixth millionth part of a Parisian line in diameter; that the ideas often expressed respecting atoms, as subjects of experience, are somewhat too confident; finally, that the power of the microscopes, which we at present possess, does not in its maximum amount to more than to make distinctly visible long opaque threads of $\frac{1}{1.200000}$ ''' diameter, and square superficies or globules of $\frac{1}{144000}$ of a line in diameter; and that for these latter they must be increased forty times, in order to satisfy what is required for reaching directly those minutest *parts of organic bodies*, whose existence has been inferred from simple deductions; and that we are to not to entertain a thought of perceptible, or ever attainable simple matter, or material primitive constituent particles.—From Poggendorff's *Annalen*

der Physick und Chemie, Vol. xxiv. p. 1, Translated in Taylor's Scientific Memoirs, Vol. I. p. 528.

Rees and Lane on the Structure of the Blood Corpuscles.—The chief points are, that the blood corpuscle contains a fluid, and that the corpuscle of mammals, as well as the other lower vertebrata, 'contains a nucleus. The human blood being $\frac{1}{3250}$ th of an inch in diameter, its nucleus is described as a thin circular layer of colourless substance measuring from $\frac{1}{4500}$ th to $\frac{1}{5000}$ th of an inch.

With regard to the fluid, if we remember rightly, M. Mandl (*Anatomie-Microscopique*) expressly states his conviction, that the appearance of the corpuscles when removed from the body is due to coagulation, as he considers the corpuscles are in fact not solid while circulating in the living body. As to the nucleus, it appears to us that Messrs. Rees and Lane have described under this appellation the blood corpuscle deprived of its colouring matter, and which has been long well known,—an old thing with a new name. Thus Sir E. Home (*Phil. Trans.* 1818, p. 198, plate 8.), has figured sixteen globules in their colouring matter, occupying the same space as twenty-five of the same globules with the colouring matter removed. Schultz has described the same central part of the blood corpuscle, which he procured by washing blood with water and then adding iodine: and Gulliver saw them in abundance in the sediment of washed blood. "The human blood corpuscles, enlarged at first by water and then deprived of colouring matter and reduced in size, generally present a diameter of $\frac{1}{4800}$ th of an inch, whether detected in the pure water, or rendered more apparent by corrosive sublimate. They have a very characteristic appearance, being remarkably flat and pellucid. It is obvious from the size, shape, and general appearance of these particles, that they are not identical with those generally described as the nuclei of the blood corpuscles. The average diameter of the discs in the first instance was $\frac{1}{3425}$ th of an inch." (*Lond. and Edin. Phil. Mag.* for Feb. 1840.) It does not appear to us to follow as a matter of course, that this basis of the mammiferous corpuscle is identical with the nucleus of the corpuscles of the oviperous vertebrata: on the contrary, we cannot help considering that there is an essential difference in this respect between the corpuscles of mammalia and the corpuscles of the lower vertebrata.—*Vide Guy's Hospital Reports, No. 13, Oct. 1841.—Lond. and Edin. Month. Journ. Med. Science, Dec. 1841, p. 906.*

Goodsir on the Morbid Anatomy of Intestinal Glands, as occurring in Continued Fever.—He stated it consist chiefly in the development within the vesicles of the Peyerian patches, of a matter presenting the appearance of nucleated cells with clear coats. This product, accumulating in quantity, destroys the walls of the vesicles, and extends itself between the mucous and submucous tissue, forming patches more or less elevated. The distension of the mucous membrane causes it to form a slough, which separates, and consists partly of the mucous membrane, but chiefly of the mass of cellular matter beneath.—*Lond. and Edin. Month. Jour. of Med. Science, April, 1842, p. 399.*

XXXVIII.—REMARKS ON SOME POINTS OF VEGETABLE
STRUCTURE.*

*By W. Hughes Willshire, M.D., M.B.S., Lecturer on Botany at
Charing Cross Hospital, &c.*

IN a late number of the "Linnæa" appears a paper of Mohl's,† in which the origin of a secondary layer, out of spiral fibres in a vessel is denied, as also that the punctations in dotted tubes, depend for their presence upon the existence of this secondary internal layer. Yet in another paragraph of the same paper it is also stated, that the first approach towards the development of the punctations is seen in the existence of a delicate *fibrous net upon* the lateral walls of the vessels, especially of those which lie next to other vessels. Now from this latter statement it certainly appears, that the presence of *fibres* is admitted by Mohl, though denied in another, and also from his averment, that this fibrous net is seen *upon* the lateral walls—which we take to mean externally to the homogeneous membrane of which the vessel is at first composed; we assume that he here admits its formation to be secondary in regard to period of development, though its situation is outward. Though it is denied by Mohl that the fibres are spiral, from what we have just stated however, we could draw no other conclusion, than that the existence of a *secondarily formed fibrous layer* is admitted, did it not appear contradicted afterwards, by his stating that no net-work or fibres exist *per se*, but are only appearances. The author says, "the meshes of the net answer to the after-present circles of the dot, consequently indicating the hollow or excavation which lies between the vessels, and the *apparent fibres* which include the meshes, are *produced by the position of the walls of the vessels.*" From this it would appear, then, that there is no distinct secondarily formed layer of fibrous net-work, but that the peculiar position of the walls of the vessel against adjacent lying structures, gives rise to hollows or excavations, the circumferential edges of which constitute the fibres of the apparent net. If this proposition be really

* From the Annals of Natural History, 1842.

† An abstract of this valuable paper appeared, together with some of the plates, in Nos. XVI. and XVII. of the Microscopic Journal.

what is meant, the theory of the circle of the punctation (*der Hof des Tüpfels*), according to Mohl, is nothing further than a depressing of the primary homogeneous membrane in certain places. It is true, that the writer admits of the existence of a secondary layer, and also of fibres *running between* the punctations in certain descriptions of vessels, but this layer is not, he says, composed of spiral fibres grown together, nor have these fibres anything to do with the formation of the circle of punctation. How mere local position can give rise to such symmetry, peculiarity of form, and spiral appearance which the dots and circles of punctated ducts really possess, it is to us difficult to imagine, as also what truly should be deduced from Mohl's own statement upon the subject. We would beg to offer a few remarks connected with this matter, as suggested by our own observations as influenced by the recent investigations of Dr. Barry on the presence of primordial fibre. Dr. Barry has demonstrated the existence of primordial filament or fibre in bodies of animal organization, and we shall endeavour to draw an analogy between some of his views with phenomena known to exist in the vegetable kingdom. The point from which we shall start is, that in the fluid ϕ animals which plays the part of a mediate agent in nutrition, and offers to the plastic powers of the ultimate cells a generative structural material, it has been shown corpuscular bodies exist, possessing a peculiar filament or fibre, and which, through the kindness of Dr. Barry, I had an opportunity of seeing at the College of Surgeons. This gentleman remarks, that it is well known that discoid bodies circulate in plants, and it remains to be shown whether they have not filaments, and whether the spiral filamentous development is *primary* (Ann. N. Hist. Vol. viii, p. 503.) The juice circulating in the lactiferous tissue of vegetables contains corpuscles and variously shaped bodies, of which *Ficus*, *Vinca*, *Chelidonium*, &c., will afford illustrations. In certain species of *Euphorbia*, however (Meyen, "Pflanzen Physiologie," Vol. ii, p. 394, *et seq.*), exist strangely and differently shaped objects circulating in the milk juice, and in which dark stripes or lines may be observed (Pl. XI, Div. 2, fig. a) : these I hold to be analogous to the phenomena shown to exist in animal blood. These objects were, formerly looked upon, from their peculiarity of shape, as crystals ; but Hartig (Erdman's and Schweiggerseidel's Journal, 1835), stated they were formed of amyllum ; and Meyen (*ut antea*), regarded the stripes or lines as caused by tearings or lacerations of the inner portion of the substance of the amylaceous body by a gradual extension of its layers.

Whatever may be the peculiar forms, however, of these bodies, and admitting their identity of re-action, as regards iodine, with that of starchy material, we conceive that, so far from regarding them as *not* the absolute essentials of the lactiferous fluid, and as *not* analogous to those of the blood, the present state of our knowledge allows us to consider them as actually the same, and as forming mediate generative structural matter for vegetable tissue, since it has been shown by Mohl (Valentin's Repert., 1841), that colour varying from brown to blue may be produced in all vegetable membranes under certain conditions by iodine; and by Payen (Valentin's Repert. and Comptes Rendus), that the substance which forms the elementary structure of all plants, is the same in all species; that this primary substance is *cellulosa*; that it alone forms the walls of earliest formed tissue, that it can be converted into dextrine by the action of sulphuric acid, and that it has, with *amidon*, a similarity of composition. To look therefore upon these bodies as mere crystals or as pieces of starch, we think now unwarranted, and they should be considered as primordial bodies of *cellulosa*; the dark lines or stripes being *probably* filaments or fibres, and the whole being analogous to the corpuscle of the blood with its filament or fibre, and which serves to produce new tissue. We confess, in our present state of knowledge with respect to vegetable anatomy, we cannot lay down as a rule, that fibre or filament is always the primary form of evolution; and we consider that, without assuming that—for which we have no ocular proof, we must yet rest satisfied with believing, that much tissue is not derivable from fibre. Yet that it often is, and primarily so, may be allowed; and every vegetable physiologist will have met with abundance of proof, that what, under less careful investigation, or merely ordinary circumstances, has appeared primary homogeneous membrane, has, with more care and delicate investigation, been resolvable into fibre or filament, primary and elementary. Although in many plants the parietes of lactiferous tissue are homogeneous, showing no trace of fibre, yet in *Euphorbia magnispina* they are resolvable into spiral filaments, which we are not inclined to believe are of secondary origin in these ducts, but of primary. Further, though there is abundance of evidence of secondary formation being thus derived in most plants, and but little of primary, yet in others the circumstances of the case are such as to lead us to believe in the origin of the general tissues being derived from primary spiral filaments. In a new species of *Stelis*, brought by Meyen from the island of Luçon, scarcely any membrane is to be found not so resolvable, and surely this, or much of it must be pri-

mary. In the description of this plant, the physiologist just mentioned states, that all the parenchymatous cells lying beneath the epidermis, are composed of tissue formed by spirally wound bands, and possess no otherwise primary homogeneous enveloping membrane. In some of the larger cells, where pressure is exerted, as at their terminations, the membrane appears structureless or homogeneous like ordinary membrane, but all the rest of it is distinctly formed of spiral filaments (Pl. XI, Div. 2, fig. *b*). Now, from all portions and structures of this plant being so composed, save the cells of the epidermis, it would appear to be a pushing of a doctrine, to maintain that the spiral fibre and filament are here but of secondary origin; and even the cells of the epidermis, we are inclined to believe, are derived from the same element, since the parchment-like cells of the aerial roots presented spiral lines, though the filaments were so firmly grown together that they could not be separated as a great part of the others could.

From the universality here evinced, we think we may not be in error in believing that Schleiden's theory, that the formation of filament does not take place independently of membrane, but occurs in the interior of cells whose membrane was originally homogeneous, meets with a great exception. The spiral lines observed by Dr. Brown on the hairs of *Tradescantia* form, we think, another. We cannot go the length of Corda, who states that the shortly articulated spiral vessels of *Nepenthes distillatoria* are devoid of an enveloping homogeneous membrane.

In that description of tissue known to vegetable anatomists by the name of fibro-cellular, there is a variety found occurring in portions of the generative apparatus of some plants, in which the fibre appears totally independent of membrane in its fully developed state, and has hence been called fibre without membrane. From the investigations of some continental physiologists, however, we are prevented from accepting these instances as examples of primary fibrous development, and as yet must regard them as examples of secondary formation only. In one remarkable case, however, in which fibre occurs, in the seeds of *Collomia*, which was first published by Dr. Lindley, though Horkel is said to have demonstrated it to his class some years before, we think a true illustration of their primary development is afforded, and in which the spiral direction is at the same time very plain. It is true, that some writers have stated their belief, that these spiral filaments are invested by a primary membrane, and hence that they are only secondary in appearance; but all that we conceive is, that they are sur-

rounded by a sort of mucus, probably cytoblastemic. In the many examples found in *Orchideæ* of fibro-membranous tissue, the fibre can only be considered as forming the secondary layer. It appears to us rather difficult to say, whether the branched filaments which connect together the granules of pollen in many plants are to be regarded as primary or not. In the earlier periods of antheroid evolution none are to be seen, it being only after the dissolution of the original cells in which the granules were formed, that they appear.

In many of the lower orders of plants, the formation of primary fibre is evident; the mesothallus of many lichens and the filaments of certain fungi illustrate the point: but in these orders great care, we conceive, must be used in drawing our conclusions, since much of fibrous and spiroid tissue, the latter in particular, is in them decidedly of secondary development. The spiroid fibres of the cells of *Sphagnum*, and the same structure which we are led to believe may be hereafter observed in *Dicranum glaucum* and *Octoblepharum albidum*, as well as the spiral filaments of *Trichia* and *Jungermannia*, are of course all secondary.

Turpin, in his reduction of vegetable forms to elementary types, assumes two conditions as the lowest; the one called *Protospheria simplex*, in which the development was spheroidal and cellular; the other *Protonemata simplex*, in which the evolution was filamentous and thread-like. These states of development have been assumed as primary and springing from a mere structureless, gelatinous, phycomater or matrix, and also that the mere evolutions of either of these forms—a simple cell or thread—constituted the lowest conditions of an entire vegetable organism. This theory in some points, however, is to us too vague to offer a support to the theory of primary filamentous development, since we conceive that the *Protonemata* is here secondary upon the *Protospheria*. There is only one argument in its favour, and that is, in its agreement with a law of physiology, namely, that as we get lower down in the scale of vegetable bodies, the *complications* of the elementary powers of which the higher orders are made up become fewer and fewer, until at last we get so low, that scarcely any *complications* exist at all, the mere *exemplification* of the element, as it were, constituting the whole individual; but yet we think that the *Protonemata* of Turpin is not so low as this, and that we cannot stop from reducing it, however low it may be, into a *complication* of a lower form—the *Protospheria*—and in which it may truly be said scarcely anything but the exemplification of the element can be seen.

Though we believe then, that on an examination of our knowledge with respect to vegetable anatomy, much will be found in support of Dr. Barry's theory, yet much will remain, and which certainly comprises more facts than exist in favour of that theory, which entitles us to maintain that tissue exists not derived from primary filament, and that the latter is in a great mass of cases a secondary formation only. While, therefore, we would modify some statements made in the observations on the structure of *Tilia*, at p. 85, but substituting for "all tissue," "much tissue," and admitting that some membrane is composed of primordial filaments, we cannot attach less importance to the doctrine of a secondary fibrous layer there maintained.

The next point to which we shall allude is in reference to the formation of the punctation on dotted vessels. With deference to Mohl, whose views, however, we may have not properly made out, from the foreign language in which they are propounded, we beg leave most decidedly to differ, and believe that the origin of the punctations is immediately dependent upon a fibrous layer; and from an analogy alluded to by Dr. Barry, and a suggestion of his with regard to the teeth of a spiral filament being concerned in their production, we hold that the matter may be properly explained: on the other hand, we must remain in the opinion of Schleiden, in opposition to that of Dr. Barry, whom we consider to look upon these fibres as primary, that this fibrous layer is of secondary origin; that it is formed within a previous homogeneous membrane, which alone is primary.

In all vessels in which the true punctations are found, whether the central dot is surrounded by a circle or not, or whether the circle alone exists, the first approach to their formation is the production of a secondary layer of fibres upon the inner surface of the apparently primary homogeneous membrane. This layer consists of filaments, which not only have a spiral direction with respect to the duct in which they are formed, but they are bent upon themselves as it were, forming sinuous curves (Pl. XI, Div. 2, fig. *c* (*a*)). In many cases the position of these filaments with respect to each other is such, that the directions of the curves are opposed to each other (as at fig. *c* (*b*)), and in all very densely punctated vessels such appears to be the case: on the other hand, the bendings of the filament may all preserve the same direction, save in a very few spots, the curves fitting into each other; no intervals being formed between them, but one continuous layer, resulting from their growth and approximation, except in the few places just alluded to (Pl. XI, Div. 2, fig. *d.*): such appears to be the case in vessels

whose punctations are few and scattered. Now it is in those spaces which result from the opposition of the smaller curves (fig. *c. (b.)*) that the punctations are formed, nothing there existing but a layer of external membrane, which becomes depressed in the form of a hollow or excavation towards the centre of the tube, the edge of the depression being the opposed curves (fig. *c, d, and e*). This answers to the larger surrounding circle of the dot, *der Hof des Tüpfels* of the Germans.

According to the size of the curves so will be that of the circle of punctation, and according to the shorter or more elongated spiral direction of the sinuous fibres along the primary layer, so will be the position of the circles with respect to each other. Thus, in the tubes of many *Coniferæ* the punctations are large, and placed in a single row down those walls of the vessel which are in approximation to others, whilst those parietes in juxtaposition with true cells have small circles only, and often distant from each other (fig. *e*). In these cases the spiral direction of the fibre is very elongated, and opposition of curves, the latter being large, ensues in a limited manner, and apparently overruled by the nature of the adjacent organs, which fully establishes one part of Mohl's theory, namely, that contiguous structure influences the formation of the punctations. In the *Coniferæ*, from many of the curves being similar in direction, there is much fibre consolidated into apparent homogeneous substance (fig. *e*, one extremity is drawn homogeneous from the consolidation of the fibres, which is the natural appearance of the whole tube, save where the punctations exist; the position of these indicates the direction and curves of the fibres, though not actually apparent). With respect to the dot seen in the circle of the depression, Mohl's view appears to us to be correct, that it is a canal traversing the walls of the vessel, thickened by superimposed matter from the interior of the vessel to the bottom of the excavation; that the external point of this canal is not pervious, is also probable from the appearance it presents (fig. *g*).

We must differ from Mohl in looking upon many of those instances which he adduces as examples of the *dot* without the circle or hollow, as instances of small hollows or depressions without the dot: in these cases, it seems to us, the great mass of spiral fibres has curves agreeing in direction with each other, and hence much of the secondary layer is not resolvable into distinct fibres. At certain places, however, slight variations in the curves take place; they become opposed, and a small depression of the outer membrane results, or the few opposed curves may be large, and hence a greater hollow will ensue; but in these ves-

sels very little matter is added to the internal layer, perhaps none, and hence no dot or canal is apparent in them (Pl. XI, Div. 2, fig. *d*).

The spiral and sinuous direction of the fibres of the secondary layer is very easily recognizable, at least when punctated vessels are carefully examined; but the attention of the observer should be strongly directed to it, as the brighter appearance of the punctations themselves, from the light only passing through a less thickened layer of membrane, draws more powerful consideration to them. It may also be well observed when a vessel is cut, or when it breaks itself at the side (as at fig. *f*).

The section of a completely formed punctation is seen at Pl. XI, Div. 2, fig. *g*; the dotted line indicates the primary membrane, the broader dark line beneath it, the fibre.

It will be seen that we thus differ from Mohl in believing that a secondarily formed fibrous layer, consisting of filaments bent upon themselves, is mainly instrumental in the formation of punctations, and agree with him in the circumstance of the depression being caused by a sinking-in of the primary membrane, but which latter condition never could exist without the previous existence of the fibres alluded to. We also consider the fibres or filaments not to be of primary development, and not to serve in this particular as a support to Dr. Barry, in what we have thought to be his views. (Figs. *a*, and *b*, are from Meyen.)

XXXIX.—MICROSCOPICAL OBSERVATIONS ON THE PATHOLOGICAL MORPHOLOGY OF SOME OF THE ANIMAL FLUIDS, BY DAVID GRUBY, M.D.—
No. 4.

Translated from the Latin by S. J. Goodfellow, M.D., &c.

[Continued from page 272.]

THE following are the tables shewing the characteristic properties of the different fluids, referred to at page 262 of our last number :—

RESULTS.

A.—OF MUCUS.

Healthy mucus and mucus generated by irritation and normal inflammation, are composed of an amorphous ductile substance (proper mucus) globules, and epithelium.

HEALTHY MUCUS.	MUCUS PRODUCED BY NORMAL IRRITATION.	MUCUS PRODUCED BY SLIGHT NORMAL INFLAMMATION.	MUCUS PRODUCED BY A MORE INTENSE NORMAL INFLAMMATION.	MUCUS PRODUCED FROM CHRONIC NORMAL INFLAMMATION.
Very few globules Much of an amorphous substance (proper mucus)	Very few globules Very much of proper mucus	Globules more numerous Less mucus	Globules very numerous Much less mucus	Globules very abundant Very little mucus
Contains but little epithelium Globules from 2—4 times larger than the blood particles No molecules, or the smallest, fill the globules Very thin envelope to the globules	Contains but little of epithelium Globules from 4—5 times larger than the blood particles The smallest molecules fill the globules Very thin smooth envelope	Contains more epithelium Globules 6—8 times larger than the blood particles The smallest molecules (filled with), and a central vesicle Smooth envelope	Contains very little epithelium Globules from 6—8 times larger than the blood particles Filled with the smallest molecules and a central vesicle Smooth envelope	Contains very little epithelium, Globules 6—8 times larger than the blood particles Filled with the smallest molecules and a central vesicle Smooth or no envelope
Not changed in water	Globules swell in distilled water	Swell in distilled water Envelopes easily broken in water	Globules swell in distilled water Envelopes easily broken	Swell in distilled water Envelopes easily broken

MUCUS PRODUCED FROM SPECIFIC OR ANOMALOUS INFLAMMATION CONTAINS, BESIDES SUBSTANCES PECULIAR TO NORMAL MUCUS, OTHER FORMS.

MUCUS GENERATED FROM TUBERCULOUS INFLAMMATION OF THE LUNGS.	DYSENTERIC MUCUS.	MUCUS OF URETHRAL BLENNORRHEA.
Besides the products of catarrhal inflammation contains yellow lenticular spheres 1—8 times larger than the globules of pus, concentrically striated, composed of concentric lamellae, which are dissolved in caustic potash. In nitric acid — solution of nitrate of silver } 5 times in volume & become transparent Some pulmonary cells and muscular fibres are seen in it.	Contains globules with central vesicles and molecules, round or ovate greenish corpuscles endowed with the smallest molecules, symmetrically disposed, and also products of catarrhal inflammation	Contains from the beginning a very few globules exceeding four times the diameter of the particles of the blood and provided with the smallest molecules and an envelope On the third day it is composed of many globules, the smallest molecules, an envelope, and central vesicle On the tenth day <i>all</i> the vesicles are endowed with central vesicles They swell and are easily broken in water On the fortieth day very few globules are found

B.—OF PUS.

Pus is composed of a certain white pellucid fluid and globules; sometimes other substances are mixed with these.

PUS GENERATED BY NORMAL INFLAMMATION.

PUS FROM A RECENT WOUND.	PUS FROM A RECENT ABSCESS.	PUS FROM AN OLD ABSCESS.	PUS FROM AN OLD WOUND.	PUS FROM THE SURFACE OF AN ORGAN WHOSE CONTINUITY IS UNINJURED.
Few globules Contains more fluid Globules from 4—6 times larger than those of the blood With very small, and larger molecules Have one central vesicle and an envelope Globules swell, and envelope bursts in distilled water	Many globules Contains but little fluid Globules 3—4 times larger than those of the blood With very small, and larger molecules One or two central vesicles, seldom without one Globules swell, and envelope broken in distilled water	Many globules Contains but little fluid Globules 3—4 times larger than those of the blood With very small, and larger molecules With a central vesicle Swell but little in distilled water	Fewer globules But little fluid Globules 3—4 times larger than those of the blood Contains a good deal of epithelium With very small, and larger molecules No central vesicle Does not swell in distilled water	Fewer globules Much fluid Globules 6—8 times larger than those of the blood Contains but little epithelium With very small, and larger molecules or none Composed of a central vesicle full of molecules, or none at all in it Sometimes swell in distilled water

PUS FROM SPECIFIC INFLAMMATION.

1. GENERATED DURING THE VARIOLOUS PROCESS.			2. GENERATED IN THE TUBERCULOUS PROCESS.
A.—DURING THE FORMATION OF PAPULÆ.	B.—DURING THE FORMATION OF VESICLES.	C.—DURING THE FORMATION OF PUSTULES.	See—Mucus produced from Specific Inflammation.
<p>The pellucid fluid extricated offers an alkaline re-action Is composed of a white pellucid fluid and a few free molecules of the larger and smallest kind, and animalcules On the third day after the eruption larger molecules and a few white almost pellucid globules 2—3 times larger than those of the blood Filled with the smallest molecules Molecular motion scarcely to be seen Animalcula are found in it</p>	<p>On the 4th day a little limped serum Contains globules endowed with the smallest and larger molecules, and a central vesicle The envelopes are not easily broken Vehement molecular motion Animalcules, and free very small globules On the 5th day the turbid serum has an alkaline re-action Contains globules of the larger yellow molecules The envelopes are easily broken The molecular motion and animalcules are well seen</p>	<p>On the 6th day the thicker yellow fluid has but a slight alkaline re-action The globules 4 times larger than those of the blood, many with an envelope easily to be broken, or without one Filled with the smallest or the larger molecules, and sometimes provided with a central vesicle The molecular motion diminished On the 7th day and beyond, the yellow thick fluid contains many globules adhering together The envelopes are very easily broken, the molecules dissipated without order Cells of epithelium and drops of fat are frequently seen in it</p>	

On the 6th day the thicker yellow fluid has but a slight alkaline re-action. The globules 4 times larger than those of the blood, many with an envelope easily to be broken, or without one. Filled with the smallest or the larger molecules, and sometimes provided with a central vesicle. The molecular motion diminished. On the 7th day and beyond, the yellow thick fluid contains many globules adhering together. The envelopes are very easily broken, the molecules dissipated without order. Cells of epithelium and drops of fat are frequently seen in it.

C.—OF SEROUS EXUDATION.

WHITE, OR GREENISH-WHITE, LIMPID, EXUDATED, SEROUS FLUID IS COMPOSED OF A PELLUCID FLUID AND GLOBULES.

SEROUS EXUDATION OF A BLADDER PRODUCED BY A BLISTER.	SEROUS EXUDATION FROM CRUDE INFLAMMATION OF INTESTINAL TYPHUS.	SEROUS EXUDATION EXTRACTED FROM THE PAPULE OF MODIFIED VARIOLA.	SEROUS EXUDATION EXTRACTED FROM THE FIBRINE OF A VILLOUS HEART.	SEROUS EXUDATION FROM A HYDROCYST.	SEROUS EXUDATION FROM OEDEMA OF THE CUTIS.	SEROUS EXUDATION EXTRACTED FROM THE SUBSTANCE OF AN INFLAMED HUMAN PLACENTA.	SEROUS EXUDATION FROM THE VAGINAL DISCHARGE ON THE THIRD PERIOD OF PREGNANCY.
Contains white globules with a very thin covering filled with the smallest molecules, or destitute of all covering. 1—2 larger than the blood globules	Contains white globules with an envelope filled with the smallest molecules 1—2 larger than the blood globules	Contains white globules with a very thin covering filled with the smallest molecules 1—4 times larger than the blood globules	Contains white globules, consisting of a very thin envelope, filled with the smallest molecules 1—2 times larger than those of the blood	Contains perfectly round white globules destitute of molecules. Scarcely larger than the globules of the blood	Contains white, or yellowish - white stellated globules, scarcely larger than those of the blood. Here and there provided with a small nucleus	Contains white globules, with an envelope filled with the smallest molecules 1—2 times larger than those of the blood	Contains white globules, with an envelope filled with the smallest molecules. Once to twice larger than the blood-discs

D.—THE MORPHOLOGY OF THE GLOBULES GENERATED DURING THE PATHOLOGICAL PROCESS.

1. THOSE WHICH OCCUR IN MUCOUS MEMBRANE.

IN HEALTHY MUCOUS MEMBRANE.	IN IRRITATED MUCOUS MEMBRANE.	IN SLIGHTLY IRRITATED MUCOUS MEMBRANE.	IN A MORE INTENSE INFLAMMATION OF MUCOUS MEMBRANE.	IN CHRONIC INFLAMMATION OF A MUCOUS MEMBRANE.
Very few yellowish-white globules are generated provided with a covering, and enclosing none or very few of the smaller molecules They are not changed in water, and are from 2—4 times larger than those of the blood	Very few yellowish-white globules are generated They are provided with an envelope, enclosing the smallest molecules, and are 4 times larger than the blood globules, and swell in water	More copious or abundant yellowish-white globules are generated. They are provided with an envelope, filled with the smallest molecules and a central vesicle, and swell, and are broken in water. They are 8 times larger than the blood globules	The yellow globules are generated in greater abundance, 8 times larger than the blood globules, endowed with an envelope, filled with the smallest molecules, and a central vesicle They swell, and are broken, in water	The yellow globules are generated in the greatest abundance, are 8 times larger than the blood globules, endowed with an envelope, or an envelope with the smallest molecules, and a central vesicle

2. THOSE WHICH ARE GENERATED IN THE SKIN.

BY THE APPLICATION OF A BLISTER.	BY THE VARIOLOUS PROCESS UNDER THE FORMATION OF PAPULÆ.	BY THE VARIOLOUS PROCESS DURING THE FORMATION OF VESICLES.	BY THE VARIOLOUS PROCESS DURING THE FORMATION OF PUSTULES.	BY THE VARIOLOUS PROCESS DURING THE FORMATION OF CRUSTS.
A very few white globules, 2—3 times larger than the blood globules, endowed with no envelope, or one filled with the smallest molecules Water does not change them	A very few white globules, 2—3 times larger than those of the blood, pellucid, endowed with a very thin covering, enclosing the smallest molecules They swell in water	Numerous yellowish-white globules, 3—4 times larger than those of the blood, endowed with an envelope, filled with the smallest and larger molecules, and a central vesicle They swell, and are broken, in the water	Very numerous yellow globules, 4—5 times larger than those of the blood, provided with the smallest and larger molecules, and the central vesicle They swell in water, and are easily broken	A few yellow whole globules, 4—5 times larger than those of the blood: many lacerated, furnished with no envelope, or with one filled with the different molecules They are easily broken

3. THOSE WHICH ARE GENERATED IN SEROUS MEMBRANE.

HYDROCYSTS.	OF THE PERICARDIUM UNDER THE FORMATION OF THE VILLOUS HEART.	OF AN INFLAMED PERITONÆUM.	OF AN INFLAMED PERITONÆUM NEONATI.	OF A VERY ACUTELY INFLAMED PERITONÆUM.
White, pellucid, perfectly round globules are formed, scarcely larger than those of the blood, with an envelope destitute of all molecules They are not changed in water	White globules, 2—3 times larger than those of the blood, endowed with a very thin envelope, filled with the smallest molecules They swell in water	Yellowish-white globules, 3—6 times larger than those of the blood, formed with an envelope, filled with the smallest and larger molecules They swell in water	Yellowish-white globules, 4—8 times larger than those of the blood, composed of a very fine envelope, with a few very small molecules or none, and filled with the smallest molecules, either with the smallest molecules, or possessing none They are not changed by water.	Yellow globules, 4—8 times larger than those of the blood, either with a very thin envelope partly or entirely filled with the smallest or larger molecules, or with no envelope They are not changed by water

OF CRUDE, RECENT INFILTRATION OF THE LIVER.	OF THE RED INFILTRATED MESENTERIC GLANDS IN ABDOMINAL TYPHUS.	IN THE PROCESS OF PURULENT INFILTRATION OF THE CELLULAR TISSUE.	IN THE SOFTENED MESENTERIC GLANDS IN ABDOMINAL TYPHUS.
The globules are white diaphanous scarcely exceeding the diameter of the blood globules, with a smooth envelope filled with the smallest molecules They swell but little in water	Yellowish white diaphanous globules exceeding from 2—4 the globules of the blood composed of an envelope filled with the smallest molecules or 6 times larger than those of the blood with an envelope filled with the smallest molecules and a central vesicle are many molecules	Round yellowish white globules, exceeding 4 times the magnitude of those of the blood, composed of an envelope filled with the smallest molecules They swell but little in water	Round yellowish white globules 4—8 times larger than those of the blood composed of an envelope with the smallest or larger molecules They swell in water
OF A HEPATIZED RECENT PLACENTA.	IN THE EXUDATION OF PLASTIC LYMPH IN GROUP.		
White globules scarcely exceeding those of the blood composed of an envelope, filled with the smallest molecules	Round yellowish white globules exceeding 3 or 4 times the size of those of the blood, composed of an envelope filled with very small molecules They are not changed by water		
OF A HEPATIZED SPLEEN.			
White globules equalling in magnitude the globules of the blood, or twice as large, with or without an envelope, but if with one, it is filled with the smallest molecules They are not changed by water			
THOSE WHICH ARE GENERATED ON THE SURFACE OF A PATHOLOGICAL (DISEASED) ORGAN.			
IN THE TENTH HOUR OF A RECENT WOUND.	OF PUS OF A RECENT WOUND 24 HOURS AND BEYOND.	OF PUS IN THE SEVENTH WEEK OF A RECENT WOUND.	FROM AN OLD WOUND SUPPURATING BUT LITTLE.
A few round, white, transparent globules 1—3 times larger than those of the blood composed of a very thin envelope filled with the smallest molecules They swell but little in water	Round yellowish white abundant globules 4—6 times larger than those of the blood, endowed with a very thin envelope with the smallest and the larger molecules, and also a central vesicle. They swell in water	Very numerous round yellowish globules 5—8 times larger than those of the blood, composed of an envelope with the smallest molecules and a central vesicle. They swell and their envelopes are broken in water	A few yellow roundish globules 2—4 times larger than those of the blood, composed of a dense envelope full of the smallest molecules They are not changed by water
ABSCESSES IDIOPATHICI RECENTISSIMI PREL ABDOMINALIS.	OF IDIOPATHIC ABSCESS OF THE LIVER.	OF AN OLD IDIOPATHIC ABSCESS.	OF A METASTATIC ABSCESS OF 6 DAYS STANDING.
Round or oblong yellow globules 4—6 times larger than those of the blood composed of a very thin envelope, with the very small and larger molecules, either with or without a central vesicle, or a simple or double one They swell in water and their envelopes burst	Round yellow globules 3—4 times larger than those of the blood composed of a thin envelope full of the larger and a few of the largest molecules They are changed but little in water	Yellow round globules 4—6 times larger than those of the blood composed of a very thin envelope, endowed with the smallest molecules : some have no envelope They swell in water	Round globules 1—3 times larger than those of the blood, composed of the smallest molecules, but seldom of an envelope Are not changed by water

EXPOSED.

SHUT.

COMPARISON BETWEEN MUCUS AND PUS GENERATED FROM NORMAL INFLAMMATION.

FORM OF THE GLOBULES.	MAGNITUDE.	COLOR.	ENVELOPE.	CENTRAL VESICLE.	MOLECULES.	DISTILLED WATER.	ACETIC ACID.	OXALIC ACID.	TARTARIC ACID.	NITRIC ACID.	MURIATIC ACID.	SOLUTION OF THE NITRATE OF SILVER.	CONCENTRATED SOL. OF NITRATE OF SILVER.	PURE AMMONIA.	LIME WATER.	PURE POTASH.	SPIRITS OF WINE.
Round	6-8 times larger than those of the blood	White or yellow	Smooth	Single or double	The very small and the larger	Envelopes are broken	Dissolves the envelopes and the very small molecules. — The nuclei 1-6 remain clearly to be seen	Dissolves the envelopes and the very small molecules	Quickly dissolves the envelopes, the white vesicle remaining	Corrupts the envelopes	Corrupts the envelopes	Corrupts the globules, and tinges them of a yellow color	First dissolves the envelopes, more slowly the very small molecules and nuclei	No change	No change	Dissolves the globules; the white mucous fluid remains	Contracts the globules
Round or oblong	3-4 times longer than those of the blood	White or yellow	Smooth or none at all	One or two, seldom none	The very small and the larger	Envelopes are broken	No change produced	No change produced	No change produced	Forms filaments	Forms filaments		Forms filaments, which are more slowly dissolved in it				
Round	3-4 times longer than those of the blood	White or yellow	Smooth or none at all	One or two, seldom none	The very small and the larger	Envelopes are broken	Dissolves the envelopes, the 2-5 nuclei remain	Dissolves the envelopes, the 2-5 nuclei remain	Very quickly dissolves the envelopes	Corrupts the envelopes	Corrupts the envelopes	Corrupts the globules, and gives them a yellow tinge	Represents the globules, transparent, the contractile nucleus remaining	No change	No change	Dissolves the globules, the mucous fluid remains	Contracts the globules, and forms nuclei
							Produces no change	Produces no change	Produces no change	Forms no filaments	Forms no filaments	Forms no filaments	Forms no filaments				

1. Of Globules.

2. Of the thick pellucid ductile fluid.
3. Of Epithelium.Some-
times of
cells of
1. Of Globules
2. Of a pellucid
fluid.
Epithelium.

MUCUS IS COMPOSED

PUS IS COMPOSED

XXXIX.—ON MOSS AGATES AND OTHER SILICIOUS BODIES.*

By John Scott Bowerbank, Esq., F.G.S.

IN a paper "On the Origin and Structure of Chalk-flints and Greensand Cherts †," Mr. Bowerbank inferred that the sponges from which he conceives these bodies originated, differed from recent Keratose sponges only in having possessed numerous silicious spicula. Since that paper was read, the author, however, has found in true Keratose sponges from Australia‡, as well as in the sponges of commerce from the Mediterranean and the West Indies||, silicious spicula in great abundance. All discrepancies, therefore, between the extinct and modern types of a portion of the animals under consideration, he says, is now removed. In these prefatory remarks, Mr. Bowerbank likewise states that there is at present only one known species of recent sponge (*S. fistularis*) the fibre of which is truly tubular.

The author then proceeds to detail the evidences of the existence in moss agates from Oberstein and other parts of Germany, as well as from Sicily, and in green jaspers from India, of the remains of sponges, in the following order: 1st, the proofs of the fibrous structure; 2nd, of the preservation of gemmules; and, 3rd, those of the existence of vascular structure. The specimens were examined as opaque objects, with direct light concentrated by a convex lens. The number of agates amounted to nearly 200, and that of green jaspers to about 70.

1. *Fibrous Structure*.—Though polished agates afforded Mr. Bowerbank in almost every specimen, strong evidence of spongy origin, yet the structure and arrangement of the fibres were seldom perfectly preserved throughout, presenting every intermediate state, from complete decomposition to the most distinct spongy tissue. The silicious matrix of these remains exhibited a clear and frequently a crystalline aspect, but the prevailing tint of the enclosed organic matter was bright red, brown, or ochreous yellow; occasionally, however, the fibre was milk-white or bright green. The colouring matter was generally con-

* From the Proceedings of the Geological Society of London, 1841, p. 431.

† See Geol. Trans., 2nd Series, Vol. vi, Part 1, 1841. Proceedings, Vol. iii, p. 278, 1840.

‡ Annals of Nat. Hist., April, 1841.

|| Microscopic Journal, Vol. i, No. 1, p. 8, 1841.

fined within the bounds of the animal tissue, leaving its surface smooth and uninterrupted; sometimes it occurred only in the interior of the tubular fibre, the sides being semi-pellucid or milk-white; whilst in other cases, not only the fibre was completely charged with colouring matter, but the surface was also slightly encrusted with it. In an agate believed to be from Sicily, the greater part consisted of a confused mass composed of innumerable bright red fibres with no perceptible remains of surrounding structure, but near the margin of the specimen the tubuli were as perfectly preserved as in a recent sponge, presenting a semi-pellucid and horny-looking substance enveloping red fibres. In those instances in which the red pigment did not appear to have entered the tube, the structure was best preserved, and Mr. Bowerbank states, that such ought to be the case, as the fibres of the *Spongia fistularis*, though hollow throughout, are closed near the natural termination. The tubes in the Sicilian agate anastomosed in the same manner as the fibres of the Mediterranean sponge of commerce, and in the places where they were intersected, they frequently exhibited the internal cavity. These characters, the author remarks, prove that the red fibre is the cast of the interior of the tube, and its diameter, he adds, is as nearly as possible the same as that of the hollow of the tube. In a moss agate from Oberstein the walls of the best-preserved tubuli were charged with red pigment, and the internal cavity was filled with pellucid silex, while the portion which had suffered most from decomposition was a confused bright red mass with obscure traces of fibrous structure.

In the green jaspers from India, the organic remains were found to be generally better preserved than in the moss agates of Germany and Sicily, and admitted of being recognised as distinct species. The green colouring matter was confined, with very few exceptions, within the boundaries of the sponge-fibre, the surrounding matter consisting of minute pellucid radiating crystals. Some of the specimens examined by Mr. Bowerbank were furnished with minute contorted tubuli, very similar to those which are described in his former paper* as occurring upon the surface of chalk-flints. In other specimens the fibres were not disposed in the same manner as in the sponge of commerce, but in a series of thin plates, resembling very much the macerated woody fibres of the leaves of some Endogenous plants. Only one recent species from Australia, is known to Mr. Bowerbank to exhibit this structure.

No spicula are mentioned by the author in either the agates or jas-

* Geol. Trans., 2nd Series, Vol. vi, Part 1, 1841.

pers, and but one instance of the occurrence of Foraminifera. The whole of the sponges contained in the green jaspers, Mr. Bowerbank refers to that division of the Keratose, which he has called *Fistularia*.

2. *Gemmules*.—A specimen of Indian green jasper, which had undergone so great decomposition as to prevent the original fibrous structure from being detected, presented innumerable globular vesicles of nearly uniform size. Many of them were simple and transparent, and could be recognised as organic only by the regularity of their size and form, and by having universally dispersed over their outer surface minute irregular black particles; but by far the greater number of them had in their interior a globular opaque body, about one-third their own diameter. Associated with these vesicles were numerous small fibrous masses resembling minute Keratose sponges, the largest of which were five or six times the diameter of the vesicles; but the smallest were identical in nature with the nucleus, though in a higher state of development. In other specimens from the same mass of jasper, larger vesicles were found more sparingly imbedded amidst the fibrous tissue of the sponge. From these characters, and their resemblance to those of the ova of some recent sponges, Mr. Bowerbank has little doubt that the vesicles are the fossilized gemmules of the sponges which gave the form to the silicious masses in which they are imbedded. An agate supposed to have come from Oberstein, presented characters which, Mr. Bowerbank is of opinion, indicated gemmules in an immature state, or in different stages of development, fixed to the fibre of the sponge; and in another specimen, believed to have been received from the same locality, gemmules in different conditions were sparingly scattered amid the tissue.

If this idea of the development of the gemmules *in situ* be correct, it will account, the author thinks, for the frequent occurrence of small detached patches of minute sponge-fibre in well-developed and large-sized tissue. Several other specimens, considered by Mr. Bowerbank to contain gemmules in different stages of development, or decomposition, are described in the paper, particularly an agate from Antigua, in the possession of Dr. R. Brown; and one from Oberstein, which contained vast numbers of small, pellucid, yellow globules, bearing a strong resemblance to the minute granules which occur in the gelatinous or fleshy sheath surrounding the fibres of the sponge of commerce, and which are probably incipient germs. In accounting for the preservation of the gemmules in a fossil state, Mr. Bowerbank refers to the covering of the ova of birds, fishes, and reptiles; and he says, it is natural to expect that the gemmules of the sponge should be similarly pro-

tected, and therefore preserved after the decay of the sponge from which they derived their origin.

3. *Vascular Structure*.—In a species of recent Turkey sponge, and in some others from Australia*, Mr. Bowerbank detected in the horny sheath which invested the solid fibre, minute anastomosing vessels; but he has not observed a similar vascular covering on the external surface of the two specimens of *Spongia fistularis* which he has examined. The co-existence, however, of this sheath with a tubular fibre, he states, he has discovered in specimens of Indian green jasper. On examining with a power of 60 linear a thin polished slice, he found, that some well preserved tubes, of greater size than the rest, had, on their external surface, a coating of darker colour than the other parts of the fibre, and were evidently analogous to the vascular sheath of the Keratose sponges of commerce. On employing a power of 500 linear, the presence of a reticulated vascular structure was exhibited as distinctly as in the recent sponge, particularly where a portion of the originally horny or fleshy part of the sheath had undergone a slight degree of decomposition. This structure Mr. Bowerbank has also detected in two fragments of flint-pebbles.

The characters exhibited by this external coating are not the only evidences of vascular structure which the author found during his examination of the organic remains inclosed in moss agates and Indian green jaspers; for he discovered in the centre of the tube which exhibited the sheath, a dark thread penetrating the cavity for a considerable distance, and when examined with a power of 500 linear, it assumed the appearance of a spiral tubular thread, frequently obscured by irregular patches, of a substance which the author conceives may have been glutinous animal matter. In another specimen of green jasper the spiral course of this curious tissue was much less obscure, and when examined with a power of 800 linear, its tubular nature was evident. The same tissue also lined the cavity of almost every fibre of the sponge which was stated to exhibit a structure composed of foliaceous plates, like the skeletons of the leaves of some Endogenous plants. In an agate, probably from Oberstein, Mr. Bowerbank says, he detected other evidences of tissue of an exceedingly remarkable character. The fibre, which was very large, had been apparently surrounded by a villose coat, and wherever, by polishing a longitudinal section it had been exposed, one or two minute vessels of uniform diameter and simple structure were visible in the

* Microscopic Journal, Vol. i, p. 10.

centre of the fibre, and ranging in the direction of its axis. At irregular distances within these vessels, the author discovered pellucid round globules, the diameter of which varied from the 1000th to the 2380th of an inch, the diameter of the vessels ranging from the 1000th to the 2000th of an inch. In other parts of the interior of the fibre were opaque or semi-pellucid spheres, and in different portions of the agate were considerable numbers of larger, opaque, round bodies, the whole of which Mr. Bowerbank considers to be gemmules in various states of development; and he thinks it is extremely probable that the vessels containing the globules were true ovarian ducts. In support of this inference, Mr. Bowerbank describes another agate, in which there were no appearances of well-defined anastomosing fibres, but which exhibited numerous long and simple thread-like fibres, apparently much decomposed, as their substance consisted sometimes of a congeries of minute separate particles, and sometimes of straight or curved lines composed of minute black bodies. In other cases these strings of incipient gemmules were contained within the boundaries of the tubes, and then presented rarely more than a single row of gemmules; but occasionally the diameter of the vessels appeared to have been much enlarged, and the gemmules were indiscriminately dispersed within its cavity. In some instances, also, they exceeded in diameter the vessel or its remains, as if they had outgrown and burst their natural boundary, or the walls of the latter had contracted. From the close resemblance in the structure and contents of these vessels to those contained in the large sponge-fibre first described, Mr. Bowerbank has little doubt, whatever may have been their original nature, that they are the same kind of tissue, under somewhat different conditions.

In all the agates and jaspers which have been microscopically investigated by the author, the spaces not occupied by remains of spongy texture were filled with siliceous or chalcedony arranged in bands which conformed more or less to the outline of the enclosed fossil. Where, however, the matrix consisted of radiating crystals, the decayed animal remains frequently appeared to have been impelled forward, in the same manner as the decomposed cellular portions of fossil wood have often yielded to the crystallizing process of the associated mineral matter.

Egyptian Jaspers, Mocha Stones, &c.—The author has examined also numerous specimens of polished Egyptian jaspers, which, when viewed as opaque objects, by direct light and with a power of 150 linear, were found to consist of finely comminuted light buff or brown irregular granules, cemented by semi-transparent siliceous, very much resembling the state in which it exists in chalk-flints and green-sand cherts, and to the varia-

tions in its colouring matter, the banded appearance of the jaspers is due. Imbedded, but very unequally, in the layers composing the jaspers, Mr. Bowerbank discovered hundreds of beautiful Foraminifera closely resembling those found in chalk-flints, and often difficult to distinguish from the species found in the Grignon sand of the calcaire grossier.

The Mocha stones which the author has examined, presented no indications of organic structure, the moss-like delineations and other appearances, resembling beautiful, thin, reticulated tissues, being due to dendritical or metallic infiltrations.

In the larger pebbles of a mass of Herefordshire pudding-stone, Mr. Bowerbank discovered the characteristic spongeous structure of chalk-flints.

In conclusion, the author dwells upon the difficulties attending the study of the bodies which he has examined and described, in consequence of the little attention which has been paid, with few exceptions, to the structure of recent sponges; and he states that the aspect of the latter, when viewed by the unassisted eye, is so different from that which it presents when seen under a high microscopic power, that those who have not been accustomed to study recent sponges with that aid, would never recognise a similar structure in the fossils described by him. He also shows that the prevalence of Keratose sponges over those belonging to the genus *Halicondria*, is what might naturally be expected, as the spicula which form the skeleton of the latter would be less likely to be preserved in their original position than the horny fibres of the former.

Lastly, the author alludes to the great share which sponges have had in the production of the solid strata of the earth's crust.

XLI.—CONTRIBUTIONS TO THE MINUTE ANATOMY OF ANIMALS.— No. II.*

By George Gulliver, F.R.S., &c.

ON THE NUCLEI OF THE BLOOD-CORPUSCLES OF THE VERTEBRATA.

By subjecting the blood of adult mammals to the slow action of a very minute quantity of dilute acetic acid, Dr. Martin Barry states, that he

* From the Lond. and Edinb. Philosophical Magazine and Journal of Science, August, 1842.—No. I. will be found at p. 141 of the present volume.

has observed nuclei in the corpuscles, which he has depicted in his recent and elaborate researches on the blood (Phil. Trans., 1841, Part 2.) Yet it seems fair to conclude, that there is an essential difference between the blood-corpuscles of mammals and those of the lower Vertebrata, since the very same treatment, which never fails to show the nuclei in the latter, will not exhibit them in the former. This, as I have elsewhere stated (Appendix to Gerber's Anatomy, pp. 13 and 30), does not prove that the corpuscles of mammals include no central matter, although it induced me to believe that these corpuscles have no nucleus like that contained in the corpuscles of the lower vertebrate animals.

When the corpuscles of the oviparous Vertebrata are mixed with water, or with dilute or strong acetic acid, the nuclei are instantly exposed in the clearest manner, appearing thick, oval or spherical, and much smaller than their envelopes. Several other vegetable acids, and sulphurous acid, may be used with the same effect; and the nuclei may also be readily shown by gently moistening with the breath some dry blood, which may be again quickly dried so as to preserve the nuclei on the slip of glass for future demonstration. But when the blood-corpuscles of Man and other mammals, not excepting the oval discs of the Camelidæ (Med. Chir. Trans., vol. xxiii, and Lancet, vol. ii, p. 101, 1840—1), are treated by any of the means just specified, and precisely under the same circumstances, no similar nuclei will be observed, unless in very young embryos; for the corpuscles of these inclose a temporary and obvious nucleus, which is probably the true *analogue* of the persistent nucleus of the corpuscles of the oviparous Vertebrata,

In the Philosophical Magazine for February, 1840, (S. 3, vol. xvi, p. 106—107), I have noticed that the blood-discs of mammalia become smaller after the removal of their colouring matter by repeated additions of water. Thus some human corpuscles, having an average diameter of $\frac{1}{3429}$ th of an inch, measured only $\frac{1}{4800}$ th after the whole of their colouring matter had been separated in this manner, when they appeared flat and pellucid, very faint, and obviously differing in size and general characters from the particles usually described as the nuclei of the blood-corpuscles. No nuclei can be discerned in these washed corpuscles, either by the aid of acids, of corrosive sublimate, or of iodine.

The first part of the preceding observation agrees in some essential points with the results obtained by Sir E. Home (Phil. Trans., 1818, pl. viii, figs. 1, 2, and 3); Schultz (Lancet, 1838—39, vol. ii, p. 713); and Donnè (Mandl, Anat. Micros., liv. i, p. 8—9.)

If the colouring matter be in like manner washed completely from the blood-corpuscles of the lower Vertebrata, both the nuclei and envelopes will remain, the latter quickly becoming circular, and the former also after a few hours. Subsequently the envelopes are scarcely visible, and the colourless matter of the corpuscles, which subsides in the water, appears to be composed chiefly of the nuclei, although with the aid of iodine many of the envelopes may be seen; and these are more or less reduced in size after a few days, especially in warm weather. Corrosive sublimate affects them very feebly, although it instantly increases the opacity, of the washed corpuscles of mammalia. When the former corpuscles have been kept some days in water, the envelopes become very irregular, and hardly perceptible by any means; the size of the nuclei is diminished, and they at length break up into extremely minute molecules.

Dilute muriatic acid renders the nucleus clearly visible in the blood-corpuscles of the oviparous Vertebrata. If the corpuscles of a mammal be treated with the same acid, many of them appear shrunk and puckered, notched at the edges, and granulated; some present a distinct central spot, irregular at the margin, like a granular nucleus; others remain smooth at the circumference, often misshapen, and generally with a dark or brilliant central part, according to the focal distance in which they are placed.

The two following figures will illustrate the foregoing observations. The blood-corpuscles of man, and of an adult bird, with some fibrine from the blood of the latter, are represented as magnified about 820 diameters.

Pl. XI, Div. 3. Outlines of blood-corpuscles of Man.—In the lower part of the figure, at *a*, corpuscles in pure blood from a prick of the finger; some of them, lying flat, exhibit the central spot, which others are without; several are seen on their edges collected into a pile; of the two standing separately on their edges, one appears concavo-concave, and the other concavo-convex. *b*. The corpuscles after thirty hours washing in cool weather, the water having been changed until the whole of the colouring matter was completely removed. These membranous bases of the discs are extremely faint; but, as shown at *c*, they may be rendered very distinct by corrosive sublimate. *d*. Appearance of fresh corpuscles quickly after treating them with dilute muriatic acid: six of them extend horizontally across the figure.

Pl. XI, Div. 4. Blood-corpuscles and fibrine of a Goose.—At *a* is a fresh unchanged corpuscle. *b*. Corpuscles after having been washed precisely in the same way as those of the man, but in colder weather;

four nuclei are seen, one of which appears to contain minuter granules or nucleoli, and another has a faint envelope. *c.* The washed corpuscles treated with iodine; some minute molecules adhere to the envelopes, and the nuclei seem to contain nucleoli; the two smaller corpuscles had remained three or four days in water, at which time many of the envelopes were destroyed, others made irregular in size and shape, and the nuclei reduced to very minute molecules. *d.* A fresh corpuscle treated with dilute muriatic acid. *e.* Two oval nuclei obtained by dilute acetic acid from fresh corpuscles, for comparison with the nuclei which appear globular after having been kept in water, as seen at *b* and *c.* *f.* Fibrine obtained from fresh blood by washing it in a linen bag. *g.* The same fibrine, in which a multitude of oval particles, like the nuclei of blood-discs, are shown by acetic acid.

On the Structure of Fibrine.

In the English version of Gerber's Anatomy, I have depicted organic germs, or objects resembling nucleated nuclei, in clots of fibrine. Those drawings were made from clots which were either pale and opaque, or as transparent and colourless as the serum of the blood. I have lately examined the red portions often found towards the edges of such clots, and observed in these coloured parts a multitude of objects like the organic germs above mentioned, but tinged with the colouring matter of the blood. These ruddy bodies appeared to be merely blood-discs entangled in the fibrinous clots, and altered in their characters; and hence the pale germs formerly delineated may likewise have been blood-discs still more changed, especially as the corpuscles of the blood are regarded as cells by Schwann, and cell-nuclei by Valentin; while Dr. Barry, as the result of his interesting observations, asks how many tissues are there which the blood-corpuscles may not form?

The corpuscles of a yellowish or ruddy hue when highly magnified, were contained abundantly in the coloured fibrine: they were rather more irregular in shape than the free corpuscles of the same blood, and differed especially from the latter in exhibiting nuclei when washed either with dilute or strong acetic acid, and even occasionally without the aid of any re-agent. The nuclei often appeared as flattened and with a central point, and sometimes with mere granules; they were commonly grouped together in the centre of the corpuscle, frequently separated, and sometimes scattered about its circumference.

The following figure was made from a minute red part, magnified 800 diameters, of a large, white, and very firm clot of fibrine from the

heart of a woman, aged 20, who died of puerperal peritonitis and acute pleurisy.

Pl. XII, Div. 1. *a*. A portion of the coloured fibrine without any addition. The corpuscles are contained in a mesh of most delicate fibrils, such as I have formerly described in clots of fibrine (Gerber's Anatomy, p. 31); some of the corpuscles, just like misshapen blood-discs, are seen on their edges; others appear mottled, and one exhibits three nuclei. Many minute circular molecules are seen in the fibrine; they were generally from $\frac{1}{30,000}$ th to $\frac{1}{15,000}$ th of an inch in diameter, but their appearance has not been at all clearly preserved in the engraving. *b*. The same washed with dilute acetic acid; the nuclei of the corpuscles and the minute molecules are distinctly exhibited. Several of the latter are attached to a corpuscle made very faint by the acid.

In fibrine obtained by washing from the blood of the oviparous Vertebrata, there is also frequently an appearance of minute fibrils, as shown at *f*, in Div. 4; but this fibrine is chiefly characterized by its containing numerous particles similar to, and probably identical with, the nuclei of the blood-corpuscles: these particles may often be seen in the fibrine without the addition of any re-agent, and acetic acid renders them very plain, as at *g* in Div. 4.

Extracts and Abstracts from Foreign Journals.

[From the *Comptes Rendus*, 1842.]

Grüby on a species of Contagious Mentagra, resulting from the development of a new Cryptogamic Growth in the Roots of the Human Beard.—The author having already shown, that two maladies, viz., *Porrigio favosa* and *Thrush* of children, result from the development of certain Cryptogamic growths in the living human tissues, proceeds now to submit to the Academy some researches in a third species of similar nature, which occurs in the hair-follicles of the human beard, constituting a malady hitherto not sufficiently characterized. This malady has its seat in those parts of the face which are furnished with hair, and most generally occupies the chin, the upper-lip, and the cheeks. These parts become covered with white or yellowish-gray scales of from 2 to 6 millim. in width, by from 3 to 8 in length; they are slightly convex in the centre, and have an angular margin, and are slightly depressed and traversed in all parts by the hairs; they are but slightly attached to the surface of the integument, but adhere firmly to the hairs. When examined microscopically, these scales are found to consist merely of epidermic scales; but the whole of the dermatic portion of the hair is surrounded with a Cryptogamic growth, forming a vegetable layer between the

sheath of the hair and the hair itself, in such a way that the hair is implanted in a sheath formed exclusively of the Cryptogamic growth, like a finger in a glove. But it is remarkable that the Cryptogamic vegetation never projects beyond the surface of the epidermis; it originates in the matrix of the hair, and in the cells of which its sheath is composed, and rises, so as to envelope that part of the hair which is inserted in the skin. This growth presents in all parts numerous sporules, which adhere, on the one hand, to the inner surface of the hair-follicle, and on the other to the hair itself; and they are so intimately connected with the follicle, that they cannot be readily detached without laceration of the latter.

No other pathological product beyond this Cryptogamic growth, is present in these cases.

The cells of the hair-follicle preserve their transparence and their normal form, but they are less adherent to each other; that is to say, they are more readily separated than in the normal state.

The three species of Cryptogamia met with in *Porrigo favosa*, the *Thrush*, and in the *Mentagra*, are easily distinguished by the following characters:—

PORRIGOPHYTA.

(*Cryptogamic Growth of Porrigo.*)

1. Have their seat among the cells of the epidermis.
2. Descend into the hair-follicles.
3. Are enclosed in a proper capsule.
4. Have rarely any granules in their stalk.
5. Their sporules are large and generally of an oval form.

APHTHAPHYTA.

(*Cryptogamic Growth of Aphtha.*)

1. Are seated among the cells of the epithelium.
2. Form fungi.
3. Their branches project from the stem, at acute angles.
4. Their branches are rarely striated.

MENTAGROPHYTA.

(*Cryptogamic Growth of Mentagra.*)

1. Are seated between the hair and its follicle.
2. Rise from the root of the hair towards the epidermis.
3. Have no capsule.
4. Have almost always granules in their stalk.
5. Their sporules are usually small and rounded.

MENTAGROPHYTA.

1. Are seated in the hair follicles.
2. Do not form fungi.
3. Their branches project at angles of from 40° to 80°.
4. The branches are almost always striated.

M. Flourens, on presenting two new livrasions of the *Microscopic Anatomy* of *M. Mandl*, drew the attention of the Academy to the proceeding which the author had employed, to prove the existence of an envelope in the milk-globules. When some of these globules are compressed between two slips of glass, which are at the same time made

to slide upon each other, it will be observed that each globule leaves a trace, formed by the fatty substance which was contained within it, and in front of this trace there will be seen a minute elongated body, placed transversely with respect to the trace, and which is in fact the membrane of the envelope rolled up. In order to produce conviction, that this little body is in reality of a membranous structure, it is sufficient to add a little ether, which dissolves the remainder of the fatty substance, and thus clearly exposes the membrane, upon which it has no action.

Memoir by M. Mandl on the Intimate Structure of the Nervous System.

1. The cerebro spinal nerves are composed of transparent fibres, with parallel borders more or less undulated, without globules or folds, and which never anastomose with each other. At the side of the external line, which indicates the border of the fibre, a second internal line is visible: consequently these primitive fibres of the nerves may be termed fibres *à double contour*. Their diameter varies from 0,05 to 0,02 of a millimètre. The changes induced by the action of water, and of different re-agents, and by cadaveric decomposition, &c., prove that the external line belongs to a sheath, which is folded or swollen here and there by the decomposition, and that the internal line indicates the margin of the contents of this sheath, which are at first transparent, but are coagulated by the causes above specified, and then assume a globular aspect. It is this alteration that has occasioned the erroneous notion of the globular structure of nerves.

2. The white substance of the brain consists of elementary fibres, *à double contour*, which are continuous with the elementary nervous fibrillæ, and the diameter of which diminishes as they approach the gray matter. The smallest fibrillæ, which have a diameter of only 0.001, 0.002 of a millimètre, do not show the double border line. The bead-like and globular forms, &c., are merely produced by the destruction of these fibres, which are very soft.

3. The gray nerves contain a great number of peculiar fibres, with a single border line (*à simple contour*) about 0.003, 0.004 of a millim. in diameter, and less disposed than the fibres of the white nerves to become varicose.

4. A nerve is not composed exclusively of one of these classes of fibres; they are always found intermixed; sometimes, however, one or the other class much preponderates in particular nerves. The anterior and posterior roots of the spinal nerves present no distinctive characters under the microscope.

5. The cortical substance of the encephalon presents several distinct elements;—

1. A *gray amorphous substance*, semifluid, and composed of united molecules.
2. A *white amorphous substance*, tenacious and elastic, readily assuming the form of minute drops, traces of which can be found just within the white substance.

3. *Gray corpuscles*, which are round or elongated, perfectly transparent, with a single border line, and having an eccentric nucleus; they are rendered cloudy by decomposition.
4. *Ganglionic corpuscles*, which are formed by the consolidation of the gray amorphous substance around the gray corpuscles. In the encephalon, these ganglionic corpuscles are readily destroyed by compression, but they are more solid in the ganglia. They are found only in the deeper layers of the gray substance.
5. The cortical substance contains extremely delicate fibres of the 0.001, 0.002 millim. in diameter.
6. The ganglia presents fibres *à double* and *à simple contour*, and, besides these, ganglionic corpuscles, solid, round or elongated. The ganglia of the lower animals, and of young animals, contain also the amorphous substances of the cortical part of the brain.
7. The medulla oblongata and the spinal marrow contain the same elements as the encephalon; the fibres are rather thicker, but are easily altered by the least compression.
8. From these researches it follows that the nervous system may be considered as composed of two portions, a white and a gray; each of these portions has a central and a peripheric part, and constitutes, in fact, a special whole. The central part of the white portion is found in the white substance of the encephalon and spinal chord, and its peripheric part in the cerebro spinal nerves. The central part of the gray portion is constituted by the gray cortical substance of the nervous centres, and its peripheric part is in the ganglionic system. In the same way that the white central portion contains the same elements which we find much more developed, however, in the peripheric part of it, so the central part of the gray substance contains what may be expressed as the rudimentary elements, which are found more perfect in the peripheric part. These two portions of the nervous system are not absolutely isolated from each other, but in every part of each more or less of the other is found intermixed. The individuality of the fibres in both portions, explains the individuality of sensation in each.

Mandl on the Termination of Nerves.—The general fact that nerves terminate in loops, has been ascertained. At whatever age the animal may be examined, the nerves are all invariably seen to terminate in this form.

It may be observed that the terminations of the nerves in young animals are not provided with a neurilemma, and that the primitive fibrilla, which at first diverges very little from the direction of the nervous bundle, become more widely separated, in order to form a true loop. (It is not, however, M. Mandl's intention to assert that the new parenchyma is formed only between the primitive fibrillæ of the nerves.) It would thence appear that the number of primitive fibrillæ is the same in young animals as in adult ones, since in no part can the division of one fibrilla into two be proved to take place. These observations are most readily made in the transparent tail of the tadpole.

The retina is composed of two very distinct portions: the internal, or that in contact with the vitreous humour, is composed of the same elements as the gray substance of the brain, and may be termed the

gray substance of the retina. The external, or white portion contains besides blood-vessels and the expansion of the optic nerve, some special elements which M. Mandl designates under the name of "*baguettes*." The shape and size of these bodies varies much in different classes of animals; they form the most external layer of the retina, and are placed obliquely. Those of fishes and birds, especially the latter, are most easy of observation, and in this class of animals their length varies from about $\frac{1}{100}$ to $\frac{1}{50}$ of a millim., and their width is about $\frac{1}{300}$ th millim. They bear on their outer extremity an oily globule, of a more or less dull yellow colour, and at the other end terminate in a very delicate filament. M. M. has been unable to determine the existence of any relation between these *baguettes* and the optic nerve.

The eyes examined must be fresh, and the retina should be retained in the liquid of the vitreous humour; all foreign fluids destroying the form of these bodies.

Dalrymple on the Structure of the Human Placenta.—In the early part of the present year the author, having pursued some anatomical investigations into the structure of the human placenta at term, and having made several drawings of the injected capillaries of the tufts, afterwards had an opportunity of seeing the copies of Weber's drawings, given in the "*Icones Physiologicæ*" of Wagner, and transferred to the pages of Dr. Willis's translation of the latter's *Physiology*. The resemblance of the present drawings to those given by Dr. Willis was so striking, as to go far of itself to prove the correctness of both draftsmen, and to corroborate the views entertained by Weber of the anatomical conditions of the organ. They differ also from the engravings of Dr. Reid, (given in the January number of the *Edinburgh Medical and Surgical Journal* for 1841), inasmuch as nowhere could be seen an artery and vein running side by side, forming an apparently single vessel, though with a double tube, and terminating abruptly in blunted extremities, where the anastomosis took place between them.

1. It appeared from Mr. D.'s observations, that the placenta was made up of the innumerable subdivisions of the umbilical vessels terminating in beautifully coiled and convoluted capillaries, which formed tufts or bouquets of vessels clothed by a prolongation of the endochorion, derived from the foetal surface of the organ.

2. That nowhere did a division of an umbilical artery terminate otherwise than in a branch of the umbilical vein; and each branch as well as tuft of vessels was covered by a prolongation of the before-named membrane.

3. That each tuft was, in fact, a real villus, the endochorion being covered externally with an epithelium-like tissue, having nucleated cells and corpuscles.

4. The uterine surface of the placenta is covered by the decidua, which does not appear to enter farther into the structure of the organ than between the lobules, and the depth to which it thus penetrates varies with the depth of the fissures.

5. That fibrous bands stretch from the fœtal to the placental surface of the organ, giving firmness and support to the vessels.

6. That there are no defined cells in the placenta, but that the nutrient fluids of the mother are poured into the interstices of the tufts, which are not bound or connected together by a common cellular tissue.

7. That on the decidual surface of the placenta are thinly scattered here and there blunt conical papillæ, about a line and a half in length, made up of innumerable coiled and contorted capillaries. Query, Are these the analogues of the fœtal cotyledons of the Ruminants?

From these observations, which were given in minute detail, the author has attempted to simplify the functions of the human placenta. He observes, that in the incubated egg, in consequence of the non-connection between the embryo and parent, a nutrient or respiratory organ is indispensable, and hence the more complicated system of vessels. That in the oviparous Vertebrata, the vitellary sac, and the omphalo-mesenteric vessels, represent the placenta of the mammalia, which is the absorbent organ of the fœtus; but while, in the one case, the nutrient materials of the mother, already aërated by her lungs, are conveyed by the uterine arteries for absorption and nutrition of the embryo; in the other, the materials of the blood are absorbed by the folds of the vitelline sac, and conveyed through the circulation of the young bird, requiring, however, contact with oxygen for a second circulation. Hence a new membrane, or one that is persistent up to the time of independent respiration, namely, the allantois; and hence, also, the more complicated system of its vessels. The allantois, as a respiratory membrane, exists only as a rudimentary organ in mammalia; and the function of the placenta being solely that of nutrition by already oxygenised materials, the cord contains only a simple system of incurrent and excurrent vessels.

Dr. Robert Lee, in the course of last summer, had examined several very minutely-injected placenta, and had no doubt, from what he had then observed, and from what he had seen in the placental tufts of the sheep, that the account now given by Mr. Dalrymple, of the manner in which the fœtal arteries of the human placenta terminated in the veins, was correct. When the blood-vessels of the human umbilical cord reached the placenta, they all carried before them a layer of the chorion, or became invested with a sheath of the endochorion, as it had been termed. It was easy to demonstrate, that any fœtal vessel of the human placenta had two coats; the inner being a continuation of the blood-vessels of the cord, the other the sheath of endochorion. Between these vessels, on the fœtal side of the placenta more particularly, there were large irregular interstices or spaces, which freely communicated together, and were called by Dr. William Hunter "the cells of the placenta." Into these, the existence of which he (Dr. Lee) had formerly doubted, the maternal blood flowed by the small curling arteries in the placental decidua, which were continuous with the arteries, or anastomosed with them. Dr. Reid had stated, that the veins of the uterus were continued into the placenta, and formed the interstices or

cells, in the organs into which the maternal blood flowed; but he (Dr. Lee) was satisfied that this opinion was incorrect. The veins of the uterus always terminated in smooth, oblique openings in the lining membrane, which were not continued into the placenta. There were oblique openings in the placental decidua, it was true, which corresponded with these smooth, oblique openings in the lining membrane of the uterus, and by means of which a communication existed between the interstices of the placenta, and the venous system of the uterus. These structures, however, were entirely different from one another; and when the placenta was separated in the labour, the arteries and veins of the uterus were opened, but not lacerated.

In answer to a question from Mr. Oldham,

Mr. Dalrymple observed, that the object of this paper has no reference to the communication between the embryo and the mother, but was confined to the special anatomy of the placenta itself. He had never had the good fortune to obtain a gravid uterus, and could not, therefore, speak from actual observation of the mode of vascular connection which existed between the foetus and the mother. He had not observed bodies resembling those seen on the foetal membranes of the Pachyderms, but thought that the blunt papillæ, mentioned in the paper, were rudiments, or analogues of the foetal cotyledons of the Ruminantia. Mr. D. expressed a hope, that those gentlemen who possessed frequent opportunities of inspecting recent placentæ, would direct their attention to the question, whether vibratile cilia existed on the covering of the endochorion forming papillæ or placental tufts, which the epithelium-like scales and corpuscles rendered not improbable. The highest powers of the microscope only would be available for such a purpose, and the placenta should be examined with the least possible delay, as much variation as to the time the vibratile action remained existed with regard to these objects, after separation from the living organism.—*Lond. and Edin. Month. Journ. Med. Science, Feb. 1842, p. 217.*

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

November 16th, 1842.—Professor Lindley, President, in the Chair.

A SECOND paper was read by ARTHUR HILL HASSALL, Esq., on the destruction of fruit by fungi. The author stated, that he had obtained more conclusive evidence of the influence of fungi in producing decay in fruit, from the fact, that this decay can be communicated at will by inoculating sound fruit with the decayed matter containing the spawn of the fungi; and the effects of this inoculation became manifest in twenty-four hours. The author concluded by observing, that the decay of fruit might be retarded by coating the surface over with a varnish, which would exclude the influence of the atmosphere. Mr. Hassall then made a few observations on a peculiar form of spiral vessel which he had found in the vegetable marrow; it consisted of secondary fibres placed longitudinally across and within the spire of the vessel; and

when the vessel was broken up or unravelled, the longitudinal fibres were found to be split up into short pieces, and to adhere to each turn of the spiral. A similar vessel, the author stated, had been noticed by Mr. Edwin J. Quekett, in the *Canna bicolor* (a specimen of which was exhibited to the meeting), and in the *Loasa contorta*, and by Mr. Wilson in *Typha latifolia*, and by Schultz in *Urania speciosa*.

A letter was read from the Rev. J. B. Reade upon various matters. The author sent for inspection a specimen of Cocoa-nut cake, covered with a dense mass of minute filamentary fungi. The cake, which has been proposed as a substitute for oil-cake, he found to contain a large quantity of ammonia; and the fungi growing on it were remarkable for the quantity of nitrogen they contained. The author then directed the attention of the Society to a statement in Liebig's Organic Chemistry, p. 114, that "the nitrogen in the air is applied to no use in the animal economy." Mr. Reade expressed his intention of hereafter showing, that it is only a very limited view of the wisdom displayed in the composition of the atmosphere, which denies the agency of its larger constituent, and of endeavouring to prove that it tends directly to the production of many millions of pounds of carbonate of ammonia in the *breath of man*. Although the quantity of this agent in a single expiration may be too small to be "quantitatively ascertained by chemical analysis," it is discoverable by the microscope, as was afterwards shown in a specimen which accompanied the communication. Specimens of microscopic animalcules, which had been sent up alive from Lewes, by Edward Jenner, Esq., through the post, were exhibited by Mr. Ross. They had been enclosed, with the weeds they were attached to, in pieces of wet linen covered over with tinfoil.

Microscopical Memoranda.

Microscopical Society of London.—The card announcing the meetings for the ensuing Session having just come to hand, we transcribe the same for the sake of reference:—

The meetings will be held for the future on the *Third Wednesday* in every month, at 8 o'clock, P.M. precisely, except during the months of July, August, and September, when there will be a recess:—

Wednesday, Nov. 16, 1842.	Wednesday, March 15, 1843.
_____ Dec. 21,	_____ April 19,
_____ Jan. 18, 1843.	_____ May 17,
_____ Feb. 15, (Anniv.)	_____ June 21,

The Annual Meeting for the election of officers will be held on *Wednesday, February 15th*, at Seven o'clock in the evening. Apartments of the Society, 21, Regent Street.

Miers on the Structure of the Epidermis and Membranous Coat of the Ovulum of Triuris hylina.—This observer met with this minute new plant, growing in a green-sward of *Jungermannia*, upon the banks of the river Paquequer, Ogan Mountains, Rio de Janeiro, which he has described

and figured it in the XIXth Volume of the Linnæan Transactions. At the end of the description the following note occurs :—

“The texture of the membranous coat of the ovulum, viewed under a high magnifying power, presents the same appearance as the epidermis of the whole plant, viz., raised, prominent vesicles, having in the centre of each globule or cell a distinct nucleus, offering that peculiar kind of texture which has been pointed out by Mr. R. Brown, as generally existing, though frequently less perfectly developed, in all monocotyledonous plants.”

Further Remarks on Fibre, by Dr. Martin Barry.—Dr. Barry examined the following objects, from two of the Mollusca, at the desire of Professor Owen, who dissected them out for the purpose; namely, from the *Oyster*, the branchial ganglion, and the branch connecting it with the labial ganglion; from the *Loligo*, the optic and branchial nerves. In all these Professor Owen recognized filaments (“fibres”), having the same remarkable appearance as those which Dr. Barry had previously shown to him in muscle.

On a subsequent occasion—several physiologists being present, one of whom was Professor Owen—there were seen muscular “fibrillæ,” not only flat, grooved, and compound, but separated at the end into their single and *simply* spiral threads—the real ultimate threads of muscle. In this instance, chromic acid was substituted for the re-agent before mentioned, as usually employed by Dr. Barry in these researches; and for the examination of muscle he now finds the chromic acid to be even preferable thereto.*

To find the muscular “fibrillæ” of a size proper for examination, and so loosely held together, that they may be separated with ease. The heart of a fish or reptile should be employed. Dr. Barry has used the heart of various fishes, as well as that of the turtle, newt, and frog, but chiefly the frog.

To find those states of voluntary muscle in which the transverse striæ are produced by the windings of comparatively large, interlaced, spiral, filaments, he recommends muscle from the tail of the *very minute* tadpole—when this larva is only 4 or 5 lines in length—or muscle from the leg of a boiled lobster, as being very easily obtained. In these states of muscle, the interlacing spirals are seen to dip inwards, towards the centre of the fasciculus, in a manner that may be represented by making the half-bent fingers of the two hands to alternate with one another, and then receiving them on the exterior side.

To find a filament in red blood-discs, Dr. Barry recommends the blood of a Batrachian reptile, such as the frog or newt, on account of the large size of the discs in these animals. The blood should be examined just before its coagulation, as well as at various periods during the formation of the clot. Dr. Barry has usually added one of the above re-agents, or nitrate of silver.—*Annals of Nat. Hist.*, May, 1842, p. 258.

* To Dr. Hanover the credit is due for bringing into notice the use of the chromic acid for such purposes.—E. M. J.

XLII.—ON THE OCCURRENCE OF *SARCINA VENTRICULI* IN THE HUMAN STOMACH.

*By George Busk, Esq., Surgeon to the Hospital Ship,
Dreadnought, &c.*

IN the Edinburgh Medical and Surgical Journal, No. 151, there is described by Mr. Goodsir, under the name of *Sarcina Ventriculi*, a peculiar morbid product, observed by him in the matters vomited by a man labouring under some form of dyspepsia. Mr. Goodsir concludes, that this production is an organized growth of vegetable nature, and that it is self-propagated in the stomach, like other parasitic vegetable growths.

Having recently had occasion to observe the occurrence of precisely similar organisms in three cases, in which many circumstances conspired to shew that the product in question could scarcely be viewed in the light in which Mr. Goodsir has considered it, I have thought it would not be uninteresting to direct attention farther to the subject, with a view of assisting in the elucidation of the true nature of these curious bodies.

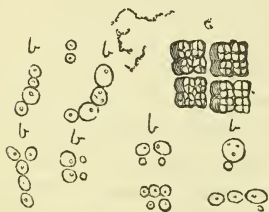
The first case in which the presence of the *Sarcina* was noticed by me was that of a young man, who was admitted into the Seaman's Hospital for severe injuries, and who previously to the infliction of those injuries had been in perfect and robust health. He had sustained rupture of the diaphragm, through which the whole of the stomach and parts of other viscera had passed into the cavity of the left pleura. He lived about eight days after his admission, during which time he constantly rejected every thing he swallowed.

The matters thus rejected were apparently regurgitated, only from the œsophagus, and had probably never entered the stomach at all, being prevented doing so by the very abrupt curve made by the œsophagus, immediately before its entrance into that viscus, owing to its displacement. Besides, however, the mere ingesta, a very large quantity of a peculiar-looking brown fluid was also occasionally rejected, amounting in the course of twenty-four hours to several pints.

The peculiar colour of this fluid was caused by the presence of a brown, flocculent matter, mixed with it in such quantity as to give it the consistence of thin gruel.

Upon being allowed to stand twenty-four hours the fluid appeared to undergo a kind of fermentation, in consequence of, or during which, the brown flocculent matter, rose partly to the top as a yeasty viscid froth,

and subsided partly to the bottom in the form of a branny sediment. This fermentation (if such it could be called) was also attended with a faint odour, something like that of fermenting wort. For the first day or two, the matter was not examined microscopically, the colour having been attributed to the presence of altered blood, proceeding from some



injury to the stomach itself. On applying the microscope, however, to a more accurate examination of it, the brown matter was found to contain no blood discs, or, at least, nothing that could be recognized as such, but to be composed almost wholly of bodies and particles, like those figured in the accompanying cut, of

which the larger ones in the right hand corner, marked (a), appear to resemble in all respects those described by Mr. Goodsir, in the paper above referred to.

The smaller particles, which were transparent, highly refractive, and apparently homogeneous, excepting a minute nucleus, may perhaps be properly considered as the constituent parts of the larger bundle-like bodies, and either to appear in their separate state, in consequence of the mechanical disintegration of the latter, or, as is perhaps more probable, to be in fact the constituent particles of those bodies, in progress towards their agglomeration; and the mode in which this agglomeration takes place in the curious form in which it appears, may be surmised upon viewing the relative positions with respect to each other, which these separate particles are disposed to assume.

Whether this is the case or not, it is perhaps difficult to determine; but it would appear more clear that these particles are multiplied, by the formation on, or from, a larger one, of one more minute, which is seen in close contact with it. The particles and bodies here figured, are represented in the positions they assumed when some of the matter, without admixture, was placed between two plates of glass.

The second case in which I met with similar organisms, was that also of a young man, previously in robust health, who had sustained fracture of the spine, and, as was supposed at the time, and as is confirmed by subsequent observation, also rupture of the diaphragm, in consequence of falling into the hold of a vessel.

About twelve hours after the occurrence of the injury he vomited once, and once only, and the matters rejected consisted of a small quantity of brownish fluid, mixed with food. The brown colour, as in the former case, was found to depend upon the presence of coloured flakes,

composed also for the greater part of the so-called *Sarcina*, precisely resembling in all respects that formerly observed.

This man never vomited afterwards, and is still, at the end of several months, living and in perfect health, excepting the paralysis, and other effects consequent upon the injury to the spine. His appetite and digestion are very good.

A third case, in which the *Sarcina* was met with, was that of a boy aged about fifteen, who was affected with disease of the hip-joint, under which he had long laboured, and by which he had been much reduced. A short time before his death, he was seized with acute pleurisy, which was attended with frequent vomiting, and in the matter thus rejected, and consisting of little more than mucus, were observed many brownish flakes, which were found to be composed principally of the *Sarcina*. Nothing peculiar was observable in the mucous membrane of the stomach in this or in the first case, upon post mortem examination; nor was any of the *Sarcina* to be detected in any other part of the alimentary canal than the stomach, on the most careful examination.

The circumstances attending the occurrence of the so-called *Sarcina* in the above cases, would appear to indicate the strong improbability of its being of the nature of a parasitic vegetable. In two of the instances, it occurred in perfectly healthy subjects, and in one of these was of very temporary duration, as its presence has, at all events, never been manifested by any subsequent symptoms. In the third case, though certainly not that of a healthy subject, there had been till within a few days before death, and the time in which the occurrence of the *Sarcina* was observed, no dyspeptic or stomach symptom whatever. This sudden occurrence and sudden disappearance are altogether opposed to the view, which would consider these peculiar organisms as a parasitic vegetable; but at the same time, I am not prepared to attempt to assign them their true nature. They appear, in some measure, to partake of the nature of a ferment; but whether they are modified epithelial cells of the stomach, or are a peculiar secretion, remains an interesting subject for inquiry; as are also the conditions under which they occur, and their chemical composition. When the fluid of the first case was exposed for many days to the air, no farther change beyond the first fermentation took place: nor was there ever any putrefactive change, nor was fermentation excited in a solution of sugar, to which some of the brown matter had been added.

XLIII.—MICROSCOPICAL OBSERVATIONS ON THE PATHOLOGICAL MORPHOLOGY OF SOME OF THE ANIMAL FLUIDS, BY DAVID GRUBY, M.D.—
No 5.

Translated from the Latin by S. J. Goodfellow, M.D., &c.

[Concluded from page 302.]

EXPLANATION OF THE PLATES.

PLATE 7.

Fig. 1. Mucous-globules taken from the anterior part of the mucous membrane of the nostrils of a healthy man aged 28 years. They are of a yellowish-white colour, some being round, others oblong, and exceed from 2—4 times the magnitude of the blood-discs.

Fig. 2. Mucous-globules taken from the posterior part of the mucous membrane of the nostrils of the same individual. Most of them are round, and consist of a diaphanous envelope, *a*, and of primitive transparent molecules, *b*. The envelope exposed to distilled water is not ruptured.

Fig. 3. Mucous-globules taken from gelatinous, tenacious mucus, evacuated during a slight diarrhoea of a year's standing. All of them are perfectly spherical, provided with a diaphanous envelope, and filled with very small primitive molecules. They are 5 times larger than those of the blood.

Fig. 4. Yellowish-white spheres from mucus secreted during an affection of the nostrils. They consist of envelopes, and a few very small primitive molecules.

Fig. 5. Mucous-globules, which were found in yellowish, very thick (the so-called concocted) mucus, ejected by coughing, from an individual labouring from catarrh of the larynx, from 2—8 times larger than the blood-globules.

They consist, in the first place, of a diaphanous envelope, *a*; 2dly, of primitive molecules, *b*; and, 3dly, of a diaphanous central vesicle, *c*.

Fig. 6. Globules from the sediment of urine, resembling turbid, fermented cabbage-water, from a man aged 30 years, labouring from calculous dysuria.

They consisted of a diaphanous envelope, *a*; of primitive molecules, *b*; of one central vesicle, *c*; or, a double one, *d*. The sediment here and there contained globules of blood, *e*.

Fig. 7. Globules from a yellow urethral blennorrhœa, investigated on the third day after a contagious coitus; from an individual 26 years of age, of a sanguineous temperament and irritable (vulnerable) skin. The globules are yellowish; besides the diaphanous envelope and the primitive molecules, they contain diaphanous central vesicles.

Fig. 8. Puriform fluid, from a preputial blennorrhœa in an individual 24 years of age, of a choleric temperament, investigated on the 9th day after the contagious coitus. It consists of globules provided with an envelope, primitive molecules, and central vesicles, and which are at one time perfectly spherical, at another oblong. They are transparent, and here and there a cell of nucleated epithelium is seen.

a, Cell of epithelium; *b*, primitive molecules; *c*, nucleus.

Fig. 9. Smaller globules, from an urethral blennorrhœa, in a robust, choleric individual, aged 25 years, investigated on the 16th day after the contagious coitus. The globules are yellowish, and show central pellucid vesicles, with a white spot, *a*.

Fig. 10. Puriform, thick, greenish-yellow fluid, investigated from an urethral blennorrhœa in a young individual, on the 21st day after a contagious coitus. It consists of large yellowish spheres, the diameter of which very rapidly increases in distilled water. They have a yellowish colour, and are composed of primitive molecules and central vesicles. The envelope is not easily broken in water.

Tumid globules, *a*; globules with ruptured envelope, *b*; primitive molecules placed in a certain order, *c*; central vesicle unchanged, *d*.

Fig. 11. Vaginal mucus, from a pregnant woman during the third period. It consists:—1st, of white diaphanous globules not perfectly round, some filled with the smaller primitive molecules, *d* and *a*; others with the larger primitive molecules, *e*; 2d, of nucleated epithelium, *b*; 3rdly, of the larger primitive molecules, *c*.

Fig. 12. Reddish flux of the lochia, from a healthy individual, aged 18 years, taken the 13th hour after parturition. It is composed of large, perfectly round, yellowish-white globules, endowed with a very fine envelope, and very few of the smallest molecules; of blood-globules, *b*; and of epithelium, *c*.

Fig. 12.* Very slightly red, lochial discharge on the third day after parturition. It is composed of large spheres, *a*; consisting of a very thin pellucid envelope and the smallest and larger molecules; of globules, *b*; provided with a central vesicle, and molecules, nucleated epithelium, *c*, and blood-globules.

Fig. 13. Lochial flux, from a healthy individual, on the 4th day after parturition:—

a, Transparent spheres of mucus, provided with a central vesicle and primitive molecules.

b, Not perfectly round, thickish, transparent spheres, filled with primitive molecules.

Fig. 14. Lochial flux, on the 5th day after parturition, from an individual affected with puerperal peritonitis in its first stage :—

a, Perfectly round diaphanous globules of mucus, provided with the smaller primitive molecules, and a central vesicle.

b, A diaphanous globule, replete with the primitive larger molecules.

Fig. 15. Lochial flux, from a young woman, aged 20 years, on the 5th day after parturition :—

a, Larger or smaller globules, provided with primitive molecules ;

b, White diaphanous globules, destitute of all molecules.

Fig. 16. Mucus from the lochial discharge of a healthy individual, aged 30 years :—

a, Globules, provided with the smaller molecules.

b, Globules, provided with from 2—4 of the larger molecules.

Fig. 17. The lochial discharge of a healthy primiparous woman, aged 17 years, investigated on the 8th day after parturition. It consists of globules, containing a central vesicle, and the smallest primitive molecules, *a* ; of large globules, *b* ; provided with the larger primitive molecules, and with moleculated nucleated epithelium, *c*.

Fig. 18. The lochial flux of a healthy woman, aged 24 years, taken on the 10th day after parturition. The larger or smaller globules of mucus, having a very few primitive molecules in them.

Fig. 19. The lochial flux of a healthy individual, 32 years of age, on the 10th day from parturition.

Fig. 20. The lochial flux, on the 12th day after parturition from an individual labouring from chronic leucorrhœa, 26 years of age. It consisted of, *a*, a globule composed of molecules without a covering ; *b*, globules provided with a covering and many molecules.

Fig. 21. Lochial flux, on the 13th day after parturition, from an individual 23 years of age, labouring from acute hepatization of the lungs, whose offspring was removed four days only from the breast. A sphere of mucus replete with molecules, *a* ; a sphere of mucus endowed with molecules and a central vesicle, *b* ; a large sphere with a few molecules, but those of the larger kind in it, *c* ; a sphere provided with a large central moleculated vesicle, *d*.

PLATE 8.

Fig. 22. Globules from the turbid sediment of urine, resembling fermented cabbage-water, from a man aged 32 years, affected with perfect paralysis of the inferior extremities, and incipient paralysis of the urinary bladder, from previous onanism; *a*, white, transparent globules, composed of the very small molecules and an envelope; *b*, lobules composed of the very small molecules without an envelope; and, *c*, transparent, white globules, composed of the very small molecules, central vesicle, and also an envelope.

Fig. 23. Puriform mucus, from ophthalmo-blennorrhœa in a new-born infant in its highest stage:—

a, Diaphanous globules, consisting of an envelope and primitive molecules.

b, Diaphanous globules, composed of an envelope, primitive molecules, and a central vesicle.

Fig. 24. The globules, as described in fig. 23, under the letter *b*, when exposed to distilled water for some minutes, are broken; the central vesicle, *a*, remains, and the very small molecules disposed in a certain order, *b*.

Fig. 25. Dysenteric mucus. *a*, Pellucid globules, provided with the smaller molecules and central vesicles; *b*, pellucid globules without molecules, but in the central vesicles; *c*, there are found the smaller molecules; *d*, a cell of epithelium; *e*, sub-greenish bodies, with the smallest molecules placed in them in symmetrical order, and nearly round or ovate.

Fig. 26. Mucus from the stomach affected with red softening. The globules of which it is composed are white, almost pellucid, perfectly round, and somewhat exceed the size of the blood-discs. There are also a good many of the larger molecules in this mucus.

Fig. 27. Thin reddish fluid taken from a wound 24 hours after amputation of a schirrous mamma. The globules of pus are 4—6 times larger than those of the blood. They consist of, *a*, an envelope; of numerous smaller molecules, *b*; of a few larger ones, *c*; and of white pellucid central vesicles, *d*.

Fig. 28. Pus from a suppurating wound after amputation of the femur, from an individual aged 23 years, whose muscles, tendons, nerves, aponeuroses and bones were atrophied on account of polyliposis. The globules are larger than those described in 27, and are also filled with the smallest molecules.

Fig. 29. A limpid fluid from a small papula, 30 hours after the appearance of the eruption of modified variola, in an individual aged 25 years, who had been vaccinated. It consists of yellowish, almost pellucid globules, *a*, provided with the smallest molecules. Some are without, others have an envelope. Also of white, roundish globules equalling the size of the blood-discs, *b*; with the smallest primitive molecules, *c*; and larger molecules, *d*.

Fig. 30. A limpid fluid, from a papula in the same individual 45 hours after the eruption. It consists of pellucid globules, *a*, replete with the smallest molecules, whose envelope is not broken in distilled water for five minutes; of pellucid white globules, *b*, scarcely smaller than those of the blood, with the larger molecules, *c*.

Fig. 31. A limpid fluid, from the vesicles of the same individual, 65 hours after the eruption. It consists of yellowish, diaphanous globules being composed of an envelope, *a*, and the larger molecules, which exercise an automatic motion, clearly seen to be tremulous, and both in and out of the envelope; of conical corpuscles, *b*, which very quickly describe a circulatory motion around their axis.

Fig. 32. A fluid, taken from the pustules on the 4th day after the eruption, resembling those of the serum of milk. It contains, 1st, perfectly smooth globules, spherical, *a*, or oval, *b*, yellow, abounding with primitive molecules, with the molecular motion well to be seen even in the envelope; the envelopes are not easily broken in distilled water. 2dly, they contain the smaller, white, transparent globules, *c*.

Fig. 33. Purulent fluid, taken from pustules on the 5th day after eruption. It contains globules which have a deeper yellow colour, and are turgid with molecules.

Fig. 34. Purulent fluid, taken from the drying pustules on the 6th day after the appearance of eruption. Globules are of a deep yellow colour, and filled with molecules, *a*; the molecular motion is impaired, the envelopes, *b*, are easily broken, and the globules without an envelope, *c*.

Fig. 35. Modified variola, Maria Mandel, aged 22 years, well nourished and plethoric. Perfectly limpid fluid, taken from the vesicles on the third day of eruption. It contains yellowish-white globules, endowed with an envelope, which is transparent, and is expanded in water; and besides the oscillating smaller molecules, *a*, or larger ones, *b*, they contain a central vesicle, *c*. The globule, *d*, almost perfectly pellucid, contains also the larger molecules on one side.

Fig. 36. Limpid fluid, taken from the vesicles on the 4th day of the eruption. Globules provided with the larger molecules, *a*; a globule,

whose envelope, when ruptured, expelled molecules, *b*; smaller yellowish globules, with the smallest molecules, *e*; globules of blood, *d*.

Fig. 37. Turbid fluid, resembling the serum of milk, taken on the 5th day of eruption. It contains, 1st, Round globules, *d*; cylindrical globules, *c*; and oval, which are marked with a very fine margin, and are of a yellowish colour. They either contain no molecules, *b*, or in one part, *a*; or they contain everywhere the larger or smaller molecules, *d*. 2dly, Smaller globules full of molecules, *h*. 3rdly, Spheres, 4—8 times larger than the globules of pus, filled with the larger molecules, *e, f*. 4thly, Sometimes a drop of fat, *g*. All the envelopes are quickly broken.

Fig. 38. Puriform fluid on the 6th day of the eruption. It consists of:—

1. Spheres, 4—6 times larger than the globules of pus, *a*.
2. Of round globules, *b*; cylindrical, *c*; half-filled, *d*; empty, *e*.
3. Of globules crowded with the smaller molecules, *f*.

There is a strong molecular motion.

Fig. 39. Pus from a pustule on the 7th day of eruption.

1. Large spheres, provided with the larger molecules, *a* and *b*.
2. Conoid and cylindric animalcules, *c* and *d*.

Weak molecular motion.

Fig. 40. On the 8th day of eruption, as in fig. 39; the molecules are also quickly broken.

Fig. 41. Pus from the pustules drying on the surface, on the 9th day of the eruption. Globules of pus broken, *a*; others as yet uninjured, *b*; they are very quickly broken and crowded with molecules; others are without any envelope, *c*; others are corrugated, *d*; a small scale of epidermis with a nucleus, *f*.

Globules of pus rapidly attract each other, and firmly adhere together, acquire a deep yellow colour; their envelopes are quickly broken, and they have a slight molecular motion.

PLATE 9.

Fig. 42. The smallest papulæ, on the 3rd day of the eruption in a robust individual, aged 22 years, enclosed a small quantity of limpid serum in the interstices, of which the papula is constructed; the forms which are seen in this fluid are conoid animalcules, provided with very small hooks; and a few transparent larger molecules, *b*.

Fig. 43. Limpid fluid, in small quantity, which is found everywhere dispersed in the papulæ on the 4th day of the eruption; it contains

globules provided with a few of the smallest molecules, *b*, *c*, also conoid animalcules, *d*; a broken vesicle, *a*. No molecular motion; the envelope, which is extremely thin, easily ruptured.

Fig. 44. The very small quantity of limpid fluid, which is extricated from the papulæ on the 5th day of the eruption, consists:—

1. Of a few pus globules of different size, *a*, *b*, *c*, *d*, filled with the very small and large molecules; the envelopes are not easily broken.
2. Of the largest transparent molecules, *e*.

Fig. 45. The limpid fluid, taken from the vesicles on the 6th day of the eruption, contains:—

1. A few yellowish-white globules, *a*, which are not easily broken.
2. The smallest globules, some of which are empty, others filled with molecules, *c*, *d*.
3. Conoid animalcules, *b*.

Fig. 46. From Barbara Fichtner, the 7th day of the disease:—

A limpid fluid, pressed from papulæ, offers a few globules, provided with a few molecules, *a*, and very small empty globules, *b*.

Fig. 47. Pus, from pustules on the 15th day of the disease. Globules of pus, without an envelope, are found, *a*; some, however, have an envelope, and are either entirely or in part filled with the smallest or larger molecules, *b*, *c*.

Fig. 48. Pus, on the 16th day of the disease, contains globules of a deep yellow colour, rarely perfectly spherical, filled with the larger or smaller molecules, *a*; most globules are irregular, and destitute of coverings, *b*. It contains, moreover, many of the smaller and larger free molecules, *c*; and also thicker cells of epithelium, without a nucleus, *d*; or thinner ones, with a nucleus, *e*. The spheres are very easily broken.

Fig. 49. Pus, on the 17th day, the same as on the preceding day.

Fig. 50. Pus, from modified variola, on the 15th day of the disease, in an individual aged 12 years. Globules of pus, for the most part irregular and without an envelope; the envelopes are quickly broken. The smallest or larger free molecules, as yet partly enclosed in coverings.

Fig. 51. Concocted very thin sputa, from the same individual affected with catarrh of the bronchi. They contain:—

1. Perfectly round globules, composed of an envelope, *a*, which is not easily ruptured; of the smallest molecules, *b*; and of a central vesicle, *c*.

2. Globules without a central vesicle, *d*.
3. Globules with very few of the smallest molecules, *e*.
4. The smallest and the larger free molecules, *f* and *g*.
5. The smallest globules, *h*.
6. Lamellæ of nucleated epithelium, *i*.
7. A thick, amorphous, pellucid mass, easily to be drawn into a filament, and not changed in water, in which all the so-described forms lie immoveable.

Fig. 52. True human variola, in a robust individual, aged 24 years, on the 7th day of the disease, and the 4th of eruption.

The simple fluid, which is extricated from the papulæ, broken here and there, contains :—

1. Globules, not perfectly round, very thin, almost pellucid, entirely filled with the smaller molecules, *c*, without central vesicles.
2. Very small and larger smooth yellowish globules, *b*.
3. Globules of blood, *d*.

Fig. 53. Saffron-coloured, frothy, mucous pneumonic sputa from the same individual. They consist :—

1. Of perfectly round globules, composed of a covering, very small molecules, and a central vesicle, *b*.
2. Of globules without a central vesicle, *d*.
3. Of blood-globules, *c*, and nucleated epithelium of a different size, *a*.
4. Of an amorphous pellucid substance. (The patient died on the 8th day of the disease.)

Fig. 54. Pus from a suppurating wound of 20 years' duration, in which were blind passages or sinuses perforating in different directions the superior part of the tibia, and whose parietes were beset with granulations beyond a line in length, occurring in a jaundiced individual aged 50.

- a*, Globules of pus filled with the very small molecules.
b, A round cell of nucleated epithelium; *c*, an oblong cell; both being endowed with primitive molecules.

Fig. 55. *a*, Globules of pus from the same individual; *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, cells of epithelium in different states of development; *b*, an early nucleated cell; *i*, a very old nucleated cell.

Fig. 56. Globules of pus from a purulent, plastic, yellow, recently-formed peritoneal exudation from a person who died on the 4th day after parturition, from schirrous of the portal vein and entero-peritonitis. Empty globules, with the central vesicle beset with molecules; others with few molecules.

Fig. 57. Globules of pus from a puriform, yellow fluid from the thymus gland of the new-born icteroid infant of this patient. Some of the globules are empty, others have a few of the larger molecules in them.

Fig. 58. The greenish-yellow purulent fluid from an extremely acute peritonitis, is composed of globules constructed with an envelope and primitive molecules, *a* ; of globules consisting of molecules without the covering, *b* ; of globules provided with a few molecules on one side, *c* ; of larger molecules, *d*, adhering together into a heap, and of peritoneal epithelium, *e*, covered with molecules.

PLATE 10.

Fig. 59. Globules of pus taken from a yellowish-white, puriform, fluid, peritoneal exudation, from a young woman who died from puerperal peritonitis ; they consist of an envelope, and the very small and larger molecules.

Fig. 60. Flocculent puro-plastic peritoneal exudation from a young person who died from puerperal peritonitis. It consists of white, soft, parallel fibres (fibrine) molecules, with white globules.

Fig. 61. Globules from an abscess have envelopes filled with extremely small molecules, *a* ; and, *b*, globules utterly without them.

Fig. 62. Globules of reddish pus, taken from a metastatic abscess of the parotid in an individual aged 30 years, seized with abdominal and splenic typhus, *a*.

a, Globules of pus from the parotid.

Fig. 62.* *b*, Corpuscles from the inflamed yellowish-white pultaceous substance of the spleen in the same individual.

Fig. 63. Globules of pus from an abscess of the liver in a robust individual, aged 42 years, who died of traumatic disturbance of the brain.

a, Globules with larger molecules.

b, Globules with the larger and the largest molecules, from the inflammatory boundary or wall of the same abscess.

Fig. 64. Cellular tissue, infiltrated with pus from the broad ligaments of a puerperal person, who died from metro-phlebitis. It consists of fibrils, for the most part running in an undulating direction, intermixed with globules of pus.

Fig. 65. Yellowish-white fibrine of the blood from a polypus (so-called) of the heart, consists of extremely thin pellucid fibrils, placed in

contact with each other, and remaining parallel; here and there the very minute molecules are observed.

Fig. 66. Yellowish plastic exudation from the internal surface of an inflamed uterus, from an individual aged 19 years, who died of puerperal fever. It consists of soft fibrils, divided by globules of pus and molecules.

Fig. 67. Yellowish, gelatinous, plastic exudation from recent pericarditis. It consists of soft fibres, running parallelly, not perfectly regular, *a*; the very small molecules being interposed, *b*; and also a few globules, *c*.

Fig. 68. Soft, gelatinous fibrils, running in a varied manner, *a*; with globules interposed, *b*; taken from the plastic exudation of a vilous heart, some days after it had been formed.

Fig. 69. Globules depicted separately from the interstices of the fibrils.

Fig. 70. Plastic lymph, formed from a vilous heart, from the 6th to the 8th day, contains roughish fibres, which form distinct areolæ.

Fig. 71. Plastic lymph, taken from a vilous heart, from 2—4 weeks. The roughish fibres form distinct areolæ.

Fig. 72. Globules, with and without an envelope, from typhous intestinal ulcers, and placed immediately beneath the crust.

Fig. 73. Corpuscles from typhus ulcers of the small intestine, from the middle of the infiltrated substance (aggr inflammatorius.)

a, Conoid corpuscles; *b*, semi-tailed corpuscle, with a nucleated vesicle; *c*, oblong corpuscles, with transparent central nuclei; *d*, very small globules, with the same kind of molecules.

Fig. 74. Texture of the base of a typhus ulcer of a more deeply infiltrated substance. Consists of very fine filaments, *a*; globules being interposed *b*; provided with very few and very small molecules.

Fig. 75. Yellow, transparent globules, from the red infiltrated mesenteric gland of abdominal typhus. The globules consist of an envelope, the smaller molecules; some are without an envelope; some are larger, others smaller,

Fig. 76. Globules from a reddish, livid, tumid, mesenteric gland of abdominal typhus in its highest stage. They consist, *a*, of a few globules; *b*, of globules provided with a central vesicle and molecules; *d*, two to five larger globules, composed of central vesicles and molecules.

Fig. 77. Globules from crude infiltration of abdominal typhus.

Fig. 78. Globules almost pellucid, round, yellowish, from a bladder, which arose from the application of a blister. Some are formed of the

very small molecules and an envelope, *a*, and others only of molecules, *b*.

Fig. 79. Stellated globules, extracted from the limpid serum of oedema of the cutis.

Fig. 80. Globules from a white, roughish, fragile (lobular inflammation) substance of a placenta. The expressed fluid was composed of the smaller molecules, and of globules scarcely exceeding as to size the globules of the blood, provided with the very small molecules.

Fig. 81. White, pellucid, round globules are found in a hydrocyst (in hydrokystide morsus diaboli.)

PLATE 6.

Fig. 82. Globules contained in the yellow opaque sputa, and in the white diaphanous sputa of phthisical individuals, treated with acetic acid. Some enclose one nucleus, *a*, some two, *b*, others three, *c*, four, *d*, or six, *e*. A globule moistened with acetic acid in a very short time exhibits three nuclei, molecules, and an envelope which are very distinctly to be seen.

a and *b*, Globules, immersed for a longer time in acetic acid; their nucleus and envelope are still well seen, but most of the molecules have disappeared; but in which, being still longer exposed to the acid, the molecules and envelope are rendered fewer and thinner, *e*.

f, Naked nuclei, treated for a very long time in acetic acid, deprived of all envelope and molecules.

Fig. 83. White diaphanous mucus, ejected by cough, treated with nitric acid.

a, A corrugated globule.

In the amorphous substance, or mucus strictly such, filaments, with black uneven margins, *b*, are formed by nitric acid.

Fig. 84. Globules of sputa, treated with solution of the nitrate of silver.

a, A globule, whose molecules have disappeared, composed of a nucleus and envelope.

b, A globule of two;

c, Of three; and,

d, One consisting of four nuclei and an envelope.

e, Three yellowish nuclei, whose envelope and molecules have disappeared.

Fig. 85. Globules of sputa, moistened with solution of oxalic acid;

the molecules have disappeared, the envelopes gradually vanished, two, *a*; three, *b*, contracted nuclei remaining.

Fig. 86. Oblong transparent cells, disposed in an imbricated manner, with two, or rather double margins running in parallel lines, the centre being of a marked, yellowish-white colour.

Fig. 87. Pulmonal cells, which are found in the sputa of phthisical individuals.

a, The yellow transparent margin, marked with striæ, running parallelly.

b, Excavated pentagonal spaces, surrounded with the margin just now described.

d, The larger molecules, partly placed in the cavity of the cell, and partly outside of it.

e, Blood discs.

Fig. 88. More pulmonal cells, some of which

a, Are double, and some

b, Are simple.

Fig. 89. A yellowish, round, lenticular sphere, marked with black striæ from phthisical sputa.

Fig. 90. Yellowish lenticular spheres of phthisical sputa.

a, An oval lenticular sphere, fissured once.

b, A round lenticular sphere, marked with more fissures.

Fig. 91. Oval lenticular spheres of phthisical sputa.

a and *b*, Both broken.

Fig. 92. Lenticular spheres of phthisical sputa.

a, Round, broken, lenticular sphere.

b, An oval lenticular sphere, whose lamella is supposed fractured with angular margins.

c, An oval lenticular sphere, freed in part from a supposed smaller lamella.

Fig. 93. A round lenticular sphere, jagged.

Fig. 94. An oval lenticular sphere, treated with a solution of nitrate of silver, marks the lamelled thick, soft, flexuous, and marked with an obscure margin, *a*, and a pellucid centre, *b*.

Fig. 95. Lenticular spheres, treated with nitric acid.

a, A round, lenticular sphere, endowed with a thick, diaphanous, white margin, and pellucid centre, *d*, surrounded with angular borders.

b, An oval, lenticular sphere, endowed with a thick, obscure margin, and a pellucid centre, whose borders are formed like the figure 8.

c, An oval, lenticular sphere, depicted curves on its side.

Fig. 96. Cylinders, endowed with black, transverse striæ, from the sputa of phthical patients.

Fig. 97. Yellowish-white globules of pus, from a healthy suppurating wound, in an individual aged 40 years.

- a*, A round globule.
- b*, An oblong globule.
- c*, A cruciform globule.
- d*, An envelope.
- e*, The larger molecule.
- f*, A central vesicle.
- g*, A globule without a central vesicle.
- h*, The very small molecules.
- i*, The larger molecules, filling an envelope.
- k*, A globule, with three white vesicles.
- l*, A globule, with four vesicles.
- m*, A globule, with a broken or dissolved envelope, composed of a white central vesicle, and the smaller and larger molecules.
- n*, A globule, with a dissolved or ruptured envelope, destitute of a central vesicle, and composed only of the larger and smaller molecules.
- o*, A globule of fat, with which it is sometimes mixed.

Fig. 98. Dried globules of pus.

- a*, Yellowish polygonal margins.
- b*, White diaphanous centre.

Fig. 99. Globules of pus, treated with acetic acid.

- a, b, c, d, e*, Diaphanous globules with dissolved molecules, whose envelopes are partly dissolved, 3 to 5 nuclei remaining, and plainly to be seen of a deep yellow colour.
- f*, and *g*, Three or four yellow nuclei, clearly to be distinguished, each of which contains a vesicle, *h*, in the centre.

Fig. 100. Globules of pus, whose envelopes and molecules have been dissolved by acetic acid, the nuclei being left. The nuclei disappear by drying; the rudiment of the dissolved envelopes and molecules again appear, *a* and *b*.

Fig. 101. Globules of pus treated by alcohol.

- Globules *a, b, c, d*, consist of a corrugated envelope and one large obscure nucleus; but *e* and *f* are composed of a corrugated envelope, with three or four transparent nuclei.

Fig. 102. Globules of pus, moistened with dilute nitric acid.

Fig. 103. Globules of pus, treated with solution of nitrate of silver, are diminished in volume.

- a*, The transparent envelope.
- b*, The nucleus clearly to be seen.

Extracts and Abstracts from Foreign Journals.

[From the *Annales des Sciences Naturelles*, September, 1842.]

M. de Martius on the Dry Gangrene of Potatoes, observed for several years past in Germany.—Potatoes affected with this disease become as hard as stone, so that they may be struck with a hammer without breaking; they retain this hardness in boiling water, and resist even the action of steam.

What renders this affection a matter of serious importance in agriculture, is the fact, that at its commencement it causes no trace of alteration, although, when the potatoes are planted, they are no longer capable of germinating.

The disease appears to have first shown itself in 1830, in several districts contiguous to the Rhine. At present, it has been observed principally in the Palatinate, between Cologne and Neuwied, near Erfurth in Saxony, Mecklenburgh, Bohemia, and Silesia. It appeared as a true epidemic, and like all diseases of that kind, presented many singular characters, difficult to be explained. It occurred indifferently on all varieties of the potatoe. On examining the gangrenous tubers which were sent to him from different parts of Germany, sufficiently distant from each other, M. de Martius found on all of them a minute mildew, more or less developed, to which he gave the name of *Fusisporium Solani*. His observations convinced him, that the presence of this minute fungus was the cause, and not the effect of the disease, as had been supposed by several agriculturists, and even by some distinguished botanists.

This epidemic, then, of the potatoe, appears to belong to that class of diseases which are attributable to the development of a parasitic vegetable; it bears considerable analogy with the ergot, mildew, rust, &c., and it is to be feared that it will prove as difficult of eradication as these latter.

The symptoms differ according to the degree of development of the disease. At first, the potatoe presents no external appearance of it, excepting some reticulated spots of a deeper colour, caused by the partial desiccation of the cuticle. In a short time afterwards the potatoe becomes still more dry, and presents in the interior several portions of a blackish, livid colour; and there are now observable also very minute portions of a whitish colour, which are the rudiments of the *Fusisporium Solani*, which appears like any other *mycelium*, in the form of a ramified fibrous tissue of extreme delicacy.

These rudiments of the fungus are found dispersed here and there in greater or less abundance in the interior of the potatoe, where its growth is extremely rapid; it penetrates the epidermis, and appears on the surface in the shape of little whitish filamentous tufts, at the summits of which innumerable sporules or grains are developed, which are very readily dispersed. At the same time the potatoe becomes more and more dry, and acquires such a degree of hardness, that it cannot be di-

vided without considerable force. The interior of the tuber then resembles a species of truffle, and is extremely compact, the surface being studded with minute white protuberances of the consistence of chalk, and which are in fact nothing more than the filaments of the fungus united in great numbers.

If the internal structure of the potatoe be examined at this stage of the infection, the cellular tissue will be found partly dried, shrivelled, and torn, and the juices contained in the interstices of the cells altered. The fecula presents a great many granules, slightly swelled, frequently rugose and torn, and upon many of them will be observed extremely minute points, in the form of irregular watery excrescences, flat or bicular, convex, and lobated, &c. These minute corpuscles are the beginnings or *prima stamina* of the fungus. Should sufficient moisture be retained in the tubera, these growths are rapidly developed, ramify, and form the parasite of which we are speaking.

The succession of the phenomena described may be readily followed, on placing a portion of the affected potatoe in water. The *mycelium* then becomes elongated, and assumes the form of confervoid filaments.

During the development of this little parasite, the potatoe loses so much of its moisture, that at last it does not contain more than $\frac{3.5}{100}$, though in the healthy condition it contains $\frac{73}{100}$, or nearly so. The fibrous part becomes of a bluish colour, and is converted partly into ulmine; the mucilaginous matter is diminished, and the albumen disappears.

However easy it may be to observe and trace the various changes which take place in the exterior of the potatoe, and to appreciate the more marked botanical characters of the parasite, it is much more difficult to learn how this fungus is formed in the interior of the latter, and in what manner its propagation is effected by granules or spores, which are not seen to penetrate through the layers of the epidermic tissue to the interior of the cells, which nevertheless appear to be the seat of the primary development of the fungus.

Three different theories have, up to the present time, been proposed, as to the mode in which the grains or spores of parasitic fungi act when they affect another plant, in the tissues of which they may be propagated.

Some authors believe that the spores penetrate into the plant through the stomata; M. Prévost, relying upon an observation made on the granules of a *Puccinia*, asserts that they elongate themselves in the plant. The first of these explanations considers the propagation of these fungi as a sort of dissemination, the second as a sort of engrafting. The third theory, which is supported principally by Knight and Decandolle, affirms, that the sporules of the parasite fall to the earth, whence they are introduced into the plant with the juices absorbed by the roots.

Neither of these authors has supported his opinion by direct experiment, serving to demonstrate the mode in which the granules are enabled to enter the plant. They do not say, either that the sporules are dissolved in the water, absorbed by the roots, or that they enter them in their primitive form.

Some experiments were undertaken with a view to the clearing up of this important question.

Some granules of *Fusisporium Solani* were sprinkled on the untouched and moist surface of a healthy potatoe, which had been brought from a country where the malady had not yet appeared.

A few weeks afterwards the epidermis showed some gangrenous spots. The potatoe withered, visibly losing a part of its juices, and after some months, the fungus was seen to come out from the interior, in the form of a white eruption. Now, as the grains of the *Fusisporium* could not perforate the epidermis, in order to penetrate into the interior, this propagation must have been effected in some other way, and this was not apparently, either by dissemination or engrafting.

It is evident that it was by an organic proceeding, which may be named "infection," since it presents the greatest analogy with the inoculation of a contagious virus.

M. Martius presumes that the sporule of this minute fungus, exerts an action altogether peculiar upon the cellular tissue with which it is found in contact; that it alters the juice contained in the first cell it meets with, and that it thence propagates the alteration from cell to cell, in such a way that in a very short time the juices contained in the whole tissue of the potatoe are infected and altered, so that they re-act on the parenchyma, which is thence morbidly changed. In this view, these juices diffused in the interior of the plant by a sort of absorption, act there as a virus, *sui generis*.

Thus the appearance of the fungus in the interior, and afterwards on the surface of the tuber does not depend on the development of a certain number of its sporules penetrating into the cellular tissue, but rather on a total change effected in the juices of the plant, which have become endued with the faculty of reproducing the fungus.

In this way may be explained the simultaneousness of its production in the interior of the tuber and the organic alteration of the latter, so that under the influence of a foreign organism, which is opposed to it, it ceases to produce its stalks, its leaves and new tubera.

This mode of explaining the propagation of the fungus, agrees equally with microscopic observation. In potatoes affected in the first degree, minute and extremely delicate cellular productions, globular or elongated, simple or articulated, are observable, situated close to the inter-cellular canals, contiguous to the epidermis, which productions present the greatest analogy with the rudiments of the fungus, which, at a more advanced period, are found dispersed in infinite number on the grains of the fecula. The admission can scarcely be avoided, that this entirely new formation is, so to say, a kind of organic deposit which is produced in the infected juices, and which eventually so alters the characters of the potatoe, that it presents rather the aspect of a fungoid substance, from which the *Fusisporium Solani* springs, and from which it protrudes as a sort of organized efflorescence.

Potatoes affected with this malady, may be compared to a sort of *pietra fungaja*.

When they are placed in circumstances unfavourable to the development of the *Fusisporium*, the germs of which have been for some time

engendered, these latter escape from them like the *Boletus tuberaster* of the *pietra fungaja* of Naples. Fresh tufts of the minute *mucedo* appear in succession, and at different epochs, on the surface of the same potatoe.

This dry gangrene is the more formidable to the agriculturist, from the multitude of granules produced by the *Fusisporium* from the ease with which they are spread, and from the long persistent vitality of the sporules of fungi, in which longevity it is most probable the sporules of this *mycelium* participate.

There is also another affection of the potatoe named *la gale*⁷ (*Raude* ou *Kartze*), which has been observed principally in the calcareous districts of Thuringia in upper Bavaria, and in Austria. It has some relation to the development of a minute fungus, of very simple structure, of the genus of the *Protomyces*. It affects chiefly the parts situated under the epidermis, and appears to be less formidable than the dry gangrene.

[From *Schlechtendal's Linnæa*, 1842.]

Göeppert on the Anatomical Structure of some Magnoliaceæ.—At the meeting of the British Association at Liverpool in the year 1837, a report was made of the results of Mr. Gardner's researches at Rio Janeiro, into the structure of the wood of palms, and on this occasion it was remarked by Professor Lindley, that the porous cells, which had been first pointed out by Kieser in the wood of the fir, occurred principally in the woody fibre of those plants which furnish resinous secretions, such as *Tasmannia* and *Spherostoma*, (Flora, oder bot. Zeit. 1838, Ir. Bd. S. 140.) Others went still further, and concluded from this very general remark, that there is a real connection or relation between the *Coniferæ* and these *Magnoliaceæ*. This being the case, the importance of a comparative anatomical examination, as much for the purposes of systematic botany, as for the determination of fossil plants, becomes very evident, since we have been accustomed hitherto to regard the well-known structure of the *Coniferæ* as altogether peculiar to and characteristic of that family of plants.

The excellent and well-known observations of Mohl, leave no doubt that the points or pores of the cells and vessels, as well in the *Coniferæ* as in all other hitherto known plants, are pretty nearly of the same nature, and are formed in the same way; and so far as this, also, Professor Lindley's position would be quite correct, and would require only to be further extended, and not confined merely to resiniferous trees, such as *Tasmannia*.

It is of more importance, however, to consider what relates to the situation of the pores in the wood cells (which are known to occur in the *Coniferæ*, on the two sides which correspond with the medullary rays), as also to the absence of the larger, round, punctated vessels, which, though deficient in the *Coniferæ*, are not usually so in the rest of the *Dicotyledonæ*.

Long desirous of determining this important point by my own observation, I at length obtained the wished-for opportunity, through the

kindness of M. Adolph Brougniart, who furnished me with a section of the wood of *Drimys Winteri*, which had 50 annual rings. The bark is covered externally with a whitish *epidermis*, which is composed of broadish, tolerably thick cells. The external two or three rows of these cells are frequently colourless, but occasionally filled with a brownish substance. In the firm part of the bark, about one line thick, lying next to the epidermis, the cells of the parenchyma are also of a brown colour. The medullary rays of the bark extend as far as this part, and constitute, together with the so-called cellular texture lying between them, the more spongy part of it. Among these, as also in the cork-like substance immediately beneath the epidermis, white points may be observed, even with the naked eye, which on examination are seen to consist of from 15 to 20 greyish-coloured, rather short cells, composed frequently of 20 concentric laminæ. These groups of cells are so hard, that they grate under the knife, and can readily be separated from the surrounding tissue in the form of whitish granules. The very prominent medullary rays, also, which are nothing more than the prolongations of the medullary rays of the wood, and which in this plant traverse all the annual layers, must be considered as a very marked distinction between the stem now in question and that of the true *Coniferæ* (*Abietinæ*, *Taxinæ*, and *Cupressinæ*), in which, as has been remarked above, only small medullary rays, traversing only some of the annual layers, are met with.

Microscopical examination, however, of a transverse section of the woody substance, shows a striking resemblance with the *Coniferæ* inasmuch as the ligneous cells, do not, as in the *Dicotyledonæ*, alternate with round, punctated vessels, but occur only as quadrilateral cells, arranged in excentric rows, extending from the medulla to the bark. The cells, however, of the medullary rays differ much more widely, since they are altogether larger than in the *Coniferæ*, and are almost always of the diameter of the neighbouring wood cells, and more elongated. To every two or three rows of wood cells, there occurs usually a small medullary ray, and after 15 or 20, a larger one, which become wider as they approach the bark, and are formed of from one to twelve cells, applied close to each other, the punctuation of which is readily seen under a magnifying power of 150 linear, in the walls, which are thinned in places. They are filled with an oily, resinous substance, of the same taste as the bark. The limit of the annual layer is marked by three or four rather thick walled cells.

In a section parallel to the medullary rays, the cells certainly everywhere appear as porous, or punctated prosenchymatous cells, with the pores arranged in a quaternary, spiral, or quincunxial manner, and are furnished with an interior, obliquely elliptical area, such as is met with in the *Araucariæ*; however, the medullary cells are instantly recognized to be like those of the other *Dicotyledonous* families, since these, as I have already pointed out (l. c. p. 24), are not quadrilateral or regularly punctated; nor are they fitted by their sides to the cells of the woody tissue, as in the true *Coniferæ*, but, being two or three times as long as wide, they are very much punctated, and are arranged alternately with the walls of the wood cells, or do not lie on the same plane with

them ; not unfrequently, also, larger cells alternate with smaller ones, which is never the case in the *Coniferae*. The single walls of the larger cells are often reduced on both sides to $\frac{1}{12}$ th or $\frac{1}{16}$ th of their thickness, but never perforated, as may be determined in the greater number of the pores ; where, frequently, 80 or 100 are situated one above another, it may be readily remarked, that they become visible to the naked eye in the form of striæ of from one-half to a whole line in breadth upon the woody fibre. The number of pores in a row on each ligneous cell, amounts to between 50 and 60, or sometimes to 15 or 20 more, as I have remarked in the *Araucaria*.

In a section parallel to the bark, the numerous extremities of the large medullary rays are readily seen, even with the naked eye. These are linear, and pointed above and below, and about 1 to 2 lines in length, and of which 6 or 7 cut across occur in the breadth of a few lines. When magnified, the larger are found to be composed of 8 to 12 rather irregular cells ; the small ones of 1 or 2. In the direction of their length, I have frequently counted in the larger ones, 80 or 100, and in the smaller, 1 to 10. The ligneous cells frequently present pores, though not in such great number as on the sides bounding the medullary rays. These pores are generally arranged in a longitudinal row on the middle of the cell, in which also they differ from the *Coniferae*, in which their occurrence on this side is one of the most rare exceptions.

A year old branch of an undescribed species of *Drimys*, and also an older one of *Tasmannia Aromatica*, showed a similar structure. Other members of the family of *Magnoliaceæ* (*Magnolia Liriodendron*, *Illicium*), which have been examined by me, present, however, some differences, as in the woody tissue of these, again, as in the other *Dicotyledonæ*, ligneous cells punctated on all sides, and alternating with round, punctated vessels, are met with.

It follows from these considerations, that on sufficient examination, the supposed agreement of *Tasmannia* and *Drimys* with the *Coniferae*, has in reality no existence, and is restricted merely to a very remarkable accordance with respect to the nearly similar composition of the woody tissue of porous prosenchymatous cells. But even in this, not to reckon the different form of the medullary rays so much difference presents itself, that a comparison of that family with the *Coniferae* cannot be instituted ; and, consequently, the endeavour to use the condition found in the living plant, as the law of investigation for the fossil, in the absence of other indication, demands previously the greatest circumspection.

Mycological Observations, as a contribution to the history of the growth and development of some *Fungi* of the classes *Gastromyceta* and *Hymenomyceta*, by J. Schmitz.

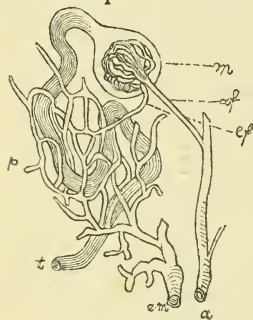
A laborious paper, too long for our limits, but containing many interesting observations with regard to the structure and development of these vegetations, and illustrated by several figures of the microscopic appearances of their substance.

Bowman on the Structure and Use of the Malpighian Bodies of the Kidney, with observations on the Circulation through that Gland.—

“The author describes the results of his examination of the structure and connexions of the Malpighian bodies of the kidney in different tribes of Vertebrata, and shows that they consist essentially of a small mass of vessels contained within dilated extremities of the convoluted uriniferous tubes. The tubes themselves consist of an outer transparent membrane (termed by the author the *basement membrane*) lined by epithelium. This basement membrane, where it is expanded over the tuft of vessels, constitutes the capsule described by Müller. The epithelium lining the uriniferous tube is altered in its character where the tube is continuous with the capsule, being there more transparent, and furnished with cilia, which, in the frog, may be seen, for many hours after death, in very active motion, directing a current down the tube. Farther within the capsule the epithelium is excessively delicate, and even in many cases absent. The renal artery, with the exception of a few branches given off to the capsule, surrounding fat and coats of the larger blood-vessels, divides itself into minute twigs, which are the afferent vessels of the Malpighian tufts. After it has pierced the capsule, the twig dilates, and suddenly divides and subdivides itself into several minute branches, terminating in convoluted capillaries, which are collected in the form of a ball; and from the interior of the ball the solitary efferent vessel emerges, passing out of the capsule by the side of the single afferent vessel. This ball lies loose and bare in the capsule, being attached to it only by its afferent and efferent vessel, and is divided into as many lobes as there are primary subdivisions of the afferent vessel; and every vessel composing it is bare and uncovered, an arrangement of which the economy presents no other example. The efferent vessels, on leaving the Malpighian bodies, enter separately the plexus of capillaries surrounding the uriniferous tubes, and supply that plexus with blood. The blood of the vasa vasorum also probably enters this plexus. The plexus itself lies on the outside of the tubes, on the deep surface of the membrane which furnishes the secretion; and from it the renal vein arises by numerous radicles.

Thus the blood, in its course through the kidney, passes through two distinct systems of capillary vessels; first, through that within the extremities of the uriniferous tubes, and secondly, through that on the exterior of these tubes. The author points out striking differences between these two systems. He also describes collectively, under the name of *Portal System of the Kidney*, all the solitary efferent vessels of the Malpighian bodies, and compares them with the portal system of the liver, both serving to convey blood between two capillary systems. In the latter a trunk is formed merely for the convenience of transport, the two systems it connects being far apart. But a portion even of this has no venous trunk, viz., that furnished by the capillaries of the hepatic artery throughout the liver, which pour themselves either into the terminal branches of the portal vein, or else directly into the portal-hepatic capillary plexus. On the other hand, in the kidney, the efferent vessels of the Malpighian bodies, situated near the medullary cones, having to supply the plexus of the cones, which is at some little dis-

tance, are often large, and divide themselves after the manner of an artery. They are portal veins in miniature. In further confirmation of his view of the existence of a true portal system in the kidney of the higher order of animals, where it has never hitherto been suspected, the author describes his observations on the circulation through the kidney of the *boa constrictor*, an animal which affords a good example of those in which portal blood derived from the hinder part of the body traverses



the kidney. He shows that here the Malpighian bodies are supplied, as elsewhere, by the artery, and that their efferent vessels are radicles of the vena portæ within the organ, and join its branches as they are dividing to form the plexus surrounding the tubes; thus corresponding with the hepatic origin of the great vena portæ. In other words, the vena portæ is an appendage to the efferent vessels of the Malpighian bodies, and aids them in supplying blood to the plexus of the tubes. Thus in this variety of the kidney, as in the liver, there is an internal as well as an external origin of the portal system; while in the

kidney of the higher animals, this system has only an internal or renal origin, viz., that from the Malpighian bodies.

A detail of the results of injection by the arteries, veins, and ducts, is then given, and they are shown to accord with the preceding description. Many varieties in the Malpighian bodies in different animals are also pointed out, especially as regards their size.

The author then proceeds to found on his previous observations, and on other grounds, a theory of a double function of the kidney. He conceives that the aqueous portion of the secretion is furnished by the Malpighian bodies, and its characteristic proximate principles by the walls of the tubes. After giving in detail his reasons for entertaining this view, he concludes by referring to the striking analogy between the liver and kidney, both in structure and function, and by expressing his belief, first, that diuretic medicines act specially on the Malpighian bodies, and that many substances, especially salts, which when taken into the system have a tendency to pass off by the kidneys with rapidity, in reality escape through the Malpighian bodies; secondly, that certain morbid products occasionally found in the urine, such as sugar, albumen, and the red particles of the blood, also, in all probability, pass off through this bare system of capillaries.—*Proceedings of the Royal Society*, No. lii. Feb. 3, 1842.

We have annexed a small figure, copied from one accompanying Mr. Bowman's paper, and illustrative of the anatomy of the kidney, as described by him.

m. Malpighian body. •

a. Arterial branch.

af. Afferent artery.

ef. Efferent vein going to form the venous or portal plexus of the gland.

t. Tubulus uriniferus, surrounded by, and imbedded in, the venous plexus.

* *Mandl on the Use of the Microscope in Medico-Legal Researches.*—

M. Orfila was the first who attempted to apply the microscope to the elucidation of questions connected with medical jurisprudence. In 1827, he speaks of this mode of investigation in his *Memoirs on the Blood and Semen*. It is to be regretted that his labours were not attended with better results; we shall presently explain the circumstances which prevented M. Orfila from deriving more benefit from his microscopic examination of the blood and semen: he discovered animalculæ in semen which had been kept dry for eighteen years on glass plates, but when he examined the same fluid, dried on linen, after having mixed it with water, he came to the conclusion that it was impossible to discover any animalculæ. M. Rattier (*Journ. de Chimie*, Mars 1837), being employed in investigating some spots on linen, moistened them with water, and found the *debris* of spermatic animalculæ and some animalculæ in a complete state. He mentions, that during the trial of *Contrafatto*, *Le-baillif* had already employed the microscope for the purpose of examining spermatic stains on linen, but for reasons which are not explained, these experiments were kept profoundly secret. M. Ollivier (d'Angers) was the first who applied the microscope practically in a medico-legal investigation. In June 1837, he was directed to ascertain whether any human hair was attached to the blade of a hatchet seized in the house of a person suspected of murder, and if this were the case, to determine the colour of the hair. With the microscope M. Ollivier ascertained that the filaments attached to the hatchet were the hairs of an animal and not of a human being, and this was afterwards fully proved (*Arch. Gén. Méd.*, Dec. 1838). On the 20th of November 1838, M. Devergie read a note before the Academy on the signs of hanging during life, and pointed out the presence of spermatic animalculæ in the urethra; he also says that he found them in stains on linen, which had been dried for ten months; M. Devergie, however, observes, that in endeavouring to separate the animalculæ from the linen, we often destroy or so mutilate them as to render it impossible to identify them. M. Gaultier was directed, in June 1838, in conjunction with MM. Labaraque and Ollivier, to examine a quantity of adulterated opium; with the assistance of the microscope he not only detected the adulteration, but also discovered the manner in which Smyrna and Egyptian opium is prepared (*Arch. de Méd.*, 1838). M. Bayard (*Ann. d'Hygiène*, July 1839), has made a series of researches with the microscope on semen dried on linen, &c. By taking care not to rub or injure the pieces of macerated linen, he has been able to discover complete animalculæ in semen dried for two months, a year, or even three years. The structure and colour of the tissues on which the sperm-stains are seated do not prevent our employing the instrument with success; for the animalculæ are easily detected on silk of all colours, cotton, thread, &c. They are likewise easily found in the vaginal mucus collected after intercourse between the sexes.

From what has been said, it is evident that the microscope has been usefully employed in medico-legal researches; and hence I have been encouraged to apply it to a question of much importance, which every

other means of investigation has hitherto failed to elucidate. For example, we have some dried spots, which we know to be blood ; but, in the present state of our knowledge, we are unable to say to what class of Vertebrata the blood belongs. It is to this point, then, that I have directed my researches, and found that the microscope enables us to determine the characters of the different species of blood.

Physical, Chemical, and Microscopic Characters of the Blood in different Animals.—We all know that blood, when drawn from its vessels, coagulates, and separates into the clot and serum. When a small portion of the clot is separated, it dries up completely, and forms a solid, friable crust of a deep red colour. This crust contains all the elements of the blood, except the water, which has passed off by evaporation. Coagulated blood, then, is composed of clot and serum, but the circulating fluid contains different elements. When examined under the microscope, we find that it is composed of corpuscles (*blood-globules*), floating in a yellowish red fluid. Now, what relation is there between the globules and *liquor sanguinis* on the one hand, and the clot and serum on the other ? The clot is chiefly composed of fibrin ; it likewise contains blood-globules enclosed in their envelope. Modern researches also show that the liquor sanguinis contains fibrine in solution. When the blood is removed from its vessels, the fibrine of the liquor sanguinis coagulates, and, closing on a number of globules, forms the clot. The liquor sanguinis, thus deprived of its fibrine and globules, becomes serum.

Let us now examine the chief properties both of dried coagulated blood, and of blood which circulates in the vessels, fixing our attention principally on the points connected with the subject of our researches. The clot is red, and, from the serum which it has imbibed, soft. Its colour is derived from the enclosed blood-globules, which latter, again, derive their colour from the colouring matter (*hæmotosine*) of the blood ; this matter dissolves when the clot is washed with water. The clot, composed, as we have said, of fibrine and globules, parts with its colour when immersed in water, but as the fibrine retains some of the globules tenaciously, frequent washing is required to remove all the colour. We thus obtain a mass of white fibrine, composed of filaments intersecting each other in all directions, and very small in proportion to the clot from which it is derived. The fibrine is heavier than water, and sinks to the bottom of a vessel containing it. These remarks will be found applicable, when we come to speak of the chemical examination of blood-stains. Without entering further on this point, we may say that fibrine thus prepared is insoluble in hot or cold water, but is very soluble in caustic-potas. The colouring matter of the blood easily dissolves in water by maceration of the clot, and this is a very important point in medico-legal researches. But the water thus impregnated with colouring matter contains, likewise, the elements of the serum enclosed in the clot. Now the chief constituent of the serum is albumen, which we obtain by evaporating the serum ; the albumen remains dry, but is soluble in cold water. When serum is gradually heated in a porcelain capsule, it gets turbid at 65°, and at 75° coagulates into an opaque mass, which is insoluble in cold or boiling water. But the appearance of the fibrine differs much

according to the quantity of albumen and water contained in the mass. When the serum contains a little water, the albumen coagulates into flocci; if the quantity of water be increased, it forms a milky-looking solution, the colour of which becomes clearer as the water is more abundant.

We can now understand what happens when a spot of blood is macerated in water. The colouring matter is dissolved, and falls to the bottom of the vessel in the form of red streaks; the dried albumen of the serum is also dissolved by the water, and when the red-coloured fluid is heated, the albumen forms flocci, or merely gives a cloudy tint, according to the quantity of water employed in the maceration. Finally, the fibrine remains undissolved.

Let us now consider the principal microscopic characters of the blood, with a view of applying them to medico-legal questions. If we place a drop of blood on a plate of glass, and apply another very thin plate over it, we obtain a transparent layer of blood, which affords many facilities for examination. If the blood be taken from one of the Mammalia, we perceive round, flattened corpuscles floating in serum; their diameter never exceeds the hundredth part of a millimetre*; they are of a pale red colour, inclining to yellow; these are the blood globules. Besides these we see another species of white mammellated corpuscles, having always the above diameter; these are the white fibrinous globules, or the *white globules*. The edges of the blood globules expand on both sides, and there is a depression in the centre, giving them the appearance of a figure of 8. When we add a considerable quantity of water to the drop of blood already mentioned, and examine the globules after some time, we find that they have nearly altogether lost their colour, and their edges are now scarcely visible; the white globules have, on the contrary, undergone no change. The loss of colour of the globules is proportionate to the quantity of water employed, and the period of its action; thus, after half an hour, we find no trace of globules, which appear to be completely dissolved; but on adding a small quantity of tincture of iodine, they assume a yellowish tinge, and reappear. They are not completely dissolved before the expiration of one or two days.

Hitherto we have spoken only of the blood of Man and Mammalia, but it is well known that the globules of oviparous animals are of a very different form; the globules of the camel tribe, however, are analogous to those of oviparous animals. Their globules are elliptical, instead of being round like those of Mammalia, and their great diameter generally exceeds the hundredth part of a millimetre. They are flat, and of a yellow colour, but instead of the central depression, they present an elevation in the centre. This elevation is produced by a central nucleus of oblong shape, and granulated, which is the more evidently seen in proportion as the globules have been allowed to remain between the glass plates. When the blood of an oviparous animal has been dried in a thin layer, and the isolated globules examined, we get a perfect view of this central nucleus. On adding water, the globules lose their colour, but the nuclei remain

* 0.443 of a line.

unchanged. Hence, if we examine under the microscope a portion of dried blood of a mammiferous animal, after it has been macerated for half an hour or an hour, we see nothing but one mass of fibrine, containing some white globules; but if the blood belong to an oviparous animal, we find all the nuclei distinctly visible.—(*To be continued.*)

Bennett on Abnormal Nutrition (commonly called Inflammation), and on the mode in which its different Products are developed, as observed in Softening, Suppuration, Granulation, Reorganization of Tissue Morbid Growths, &c. &c.—Dr. Bennett commenced his communication, by alluding to the well-known fact, that the blood circulating to every part of the living organism, carried with it the principles of nutrition. These appear to exude through the minuter vessels dissolved in the liquor sanguinis or blood plasma, which constituted a blastema or formative fluid for the formation of nucleated cells. The cells thus formed, underwent different kinds of development, some being formed into bone, others into muscle, nerve, tendon, filamentous tissue, and so on. The insensible formation and development of these cells constituted healthy nutrition.

This process might be deranged, or rendered abnormal, in various ways: *1st*, from an increase or diminution in the whole mass of the blood; *2dly*, from a greater or less change in the relative amount of its different chemical constituents; and, *3dly*, from mechanical and other causes acting more especially upon any part of the frame. It was to the phenomena accompanying the latter condition that Dr. Bennett was desirous of directing the Society's attention. These were rapidly described, as they have been observed by numerous authors, and confirmed by Dr. Bennett, viz., *1st*, Contraction of the capillaries, and diminished velocity through them of the flow of blood; *2dly*, Dilatation of the capillaries, and diminished velocity of the blood's current; *3dly*, Oscillation of the column of blood, and encroachment on the lymph spaces; *4thly*, Complete stagnation of the blood, the red corpuscles crowded together in an amorphous mass, and brought into immediate contact with the vascular walls.

During the latter stage of this process, or at its termination, three circumstances might take place: *1st*, Effusion of serum; *2dly* Exudation of blood plasma; and, *3dly*, Extravasation of blood by rupture of the vessel.—The object of the communication was to describe the changes which followed exudation of the liquor sanguinis.

The blood plasma on being exuded from the blood-vessels, might remain fluid for some time, and would then be necessarily re-absorbed. Vogel and Vogt refer to cases where on cutting across small cavities in the brain, the fluid they contained immediately coagulated. More frequently, however, instead of remaining fluid, the blood plasma coagulates. When this has once occurred, it undergoes changes, which vary in different cases, before it can be re-absorbed or removed from the system. The material exuded constitutes a blastema for the formation of nucleated cells, which generally, though not always, vary in character according to the nature of the tissue in which the exudation takes place.

In parenchymatous organs, the liquor sanguinis usually coagulates in the form of granules, which may be seen coating the vessels, and filling up all the space between the ultimate tissue of the organ. By this process, the organ affected is rendered perfectly dense or hepatized. After a time or during the exudation, nucleated cells, (*exudation corpuscles*,) are formed, which vary in size from 1-100th to 1-25th of a millimetre in diameter. They become filled with granules from 1-500th to 1-700th of a millimetre in diameter. The cell wall then bursts, and the granules escape. By means of this process, and the development of the exuded mass more or less into cells, it is broken up, and rendered fluid. Thus the morbid state in organs, named *softening*, is produced.

The exudation corpuscle may be distinguished by its undergoing no change on the addition of acetic acid. Ether and caustic potash entirely dissolve them; liquor ammoniæ renders them soft and easily broken down.

On the surface of serous membranes, the exudation generally passes into cells and very minute fibres. These cells, (*plastic corpuscles*,) are transparent, from 1-100th to 1-75th of a millimetre in diameter, formed of a delicate wall, containing granules 1-1000th to 1-600th of a millimetre in diameter, varying in number from 3 to 12. They are not perfectly round, but somewhat irregular in form. The mode of formation of the minute fibres is unknown. Gulliver has pointed out that they are not the result of cellular development.

The plastic corpuscle may be distinguished by its wall contracting, and the edge becoming thicker on the addition of acetic acid. The shape is also rendered more irregular; it is dissolved in ether and caustic potash, and not affected by water.

In the skin, loose cellular tissue, &c., the exudation commonly passes into cells, usually from 1-100th to 1-120th of a millimetre in diameter, perfectly round, with a defined edge, containing several granules, and sometimes a round nucleus. These cells, (*pus corpuscles*,) swim in a fluid, roll freely on each other, are of a yellow-greenish colour, and constitute the organized part of the fluid universally known as *pus*. They are not formed from the exudation corpuscle, or epithelial cells, as has been supposed, but arise primarily from the exuded blood plasma.

The pus corpuscle may be distinguished by its swelling out and becoming more transparent on the addition of water; by the cell wall being dissolved, or nearly so, in acetic acid, whilst the nucleus is rendered more distinct in the form of two or three granules, generally from 1-300th to 1-400th of a millimetre in diameter. They are dissolved in ether and concentrated alkalis.

The exudation, plastic, and pus corpuscles, although most commonly formed in the situations referred to, are not exclusively so. The pus corpuscle may sometimes be formed in parenchymatous tissues, and exudation corpuscles in cellular tissue. Sometimes they may be more or less mixed together. Thus the plastic and exudation corpuscles are commonly formed in the lung, and exudation corpuscles may frequently be found swimming among those of pus.

The exudation may also pass into *organization of tissue*, apparently by the same process as takes place in a state of health. Should it exist in

small quantities, and further exudation be checked by bringing the divided parts into apposition, re-organization of tissue occurs *rapidly*, and *union by the first intention* is established. On the other hand, when this process takes place *slowly*, a state called *hypertrophy* is produced.

When loss of substance is occasioned, the exudation passes partly into organization of tissue, and partly into pus corpuscles, by means of which a *granulating surface* is produced. A fungous granulation examined under the microscope, exhibits all the stages of development presented by cells, passing into fibres, as figured by Schwann. Externally these are covered with pus corpuscles. As the former increase the latter diminish, until at length a normal tissue is reproduced, or a dense fibrous mass, denominated *cicatrix*.

Lastly, the exudation may be transformed into nucleated cells of different shapes, round, oblong, caudate, stellate, more or less square, &c., &c., either mixed or unmixed with fibres, constituting the different kinds of morbid growths, as indicated by Müller.

Thus in the same manner as in a state of health, cells originating in the effused liquor sanguinis, may undergo different kinds of development, as into fibre, muscle, nerve, &c., constituting *normal* nutrition; so in a morbid state cells originate in the exuded liquor sanguinis, which are transformed into exudation, plastic, pus cells, tumours, &c., constituting *abnormal* nutrition.

Dr. Bennett agreed with Andral and Majendie in considering that the term inflammation was inapplicable to the explanation of the phenomena he had described. He pointed out how the cardinal symptoms of inflammation, pain, heat, redness, and swelling, were partly dependent on the exudation, and partly on the congestion which preceded it. He had even seen some cases of encephalitis, where the central parts of the brain were softened, and contained numerous exudation corpuscles, although during life no pain or heat, and after death, no redness or swelling had been observed.

Inflammation, therefore, was only a part of one great morbid action occurring in the frame, which might be denominated abnormal nutrition, and more especially that species of it dependent on increased exudation of liquor sanguinis.

Numerous authors had referred inflammation to increased nutrition or secretion. Dr. Alison more especially seemed to consider this essential to the inflammatory process, (Lib. of Med., Art. *Inflammation*.) Before the doctrine of cyto-genesis was established, however, nutrition of parts was invariably connected with vascularity, and pus was considered an unorganized fluid. At present we must regard pus, lymph, softening from exudation, &c., as being highly organized, and resulting from an active process of nutrition. Hitherto increased nutrition, as connected with active inflammation, has been mere hypothesis; Dr. B. stated, that it was the object of his communication to *demonstrate* its correctness.

Remarks, chiefly on the inapplicability of the term abnormal nutrition, as applied to some of the changes induced by inflammatory action, were made on Dr. Bennett's paper, by Drs. MacLagan, Macaulay, and Professors Miller and Simpson.—*Lond. & Edin. Med. Jour. Dec. 1842.*

Obituary.

DANIEL COOPER, M.R.C.S., A.L.S., &c.

THE suddenness of the event, and its occurrence so shortly before the time of publication of our last number, prevented more than the mere announcement of the decease of Mr. DANIEL COOPER, whose worth, not only as a labourer in the field of science, but in all the relations of life, certainly claims a more extended notice in the pages of that Journal which owes its origin and existence to his zeal and industry.

We have been favoured with a sketch of Mr. Cooper's brief career, from the pen of one of his oldest and most attached friends, Dr. J. F. Young, whose intimate knowledge of Mr. Cooper's merits, from youth upwards, and of the no slight difficulties with which he had to contend, in striving for eminence and independence, renders the terms of praise and admiration in which he speaks of the character of his departed friend, of more weight than would attach to the panegyric of one less intimately acquainted with him. We regret that the length of Dr. Young's communication prevents our giving it entire; but by it we are informed, that Mr. Cooper's age, at the time of his death, was but 26.

He was the second son of Mr. J. T. Cooper, the well-known eminent chemist, and formerly chemical lecturer at Mr. Grainger's and other medical schools. He entered the medical profession under the care of Dr. J. F. Young, and during his pupillage, frequently assisted his father and brother in the laboratory and lecture-room, devoting himself assiduously to the study of his profession and the collateral sciences, and especially to botany, which he cultivated with great zeal and considerable success. He very actively promoted the formation of the Botanical Society of London, of which, in fact, he may be termed the founder, and to which he filled the office of curator, he also delivered lectures on botany at various schools around the metropolis, and afterwards succeeded Dr. Dickson in the Webb Street School of Medicine.

He published the '*Flora Metropolitana*,' with a '*List of the Land and Fresh Water Shells in the environs of London*,' and several other minor but useful elementary works on the same subject. He also remodelled and edited '*Bingley's Useful Knowledge*.' He became afterwards an assistant in the natural history department at the British Museum, and while there, obtained a medical appointment in the army, and was employed for some time in the arrangement of the Museum at Fort Pitt. Hence he was appointed to the 17th Lancers, and joined that regiment at Leeds, a few months before his death, which was caused by constitutional irritation, supervening upon a slight injury.

Soon after the formation of the Microscopical Society in 1839, Mr. Cooper projected this Periodical, with the view of enabling the scientific inquirer to perpetuate his observations, and of collecting, for the use of those engaged in microscopical pursuits the results of the observations of others, on similar subjects.

From his zeal, talents, and habits of application, and his having at length attained a position in which leisure and opportunity were afforded him in such pursuits, it is much to be regretted that science should have lost so promising a cultivator; and from his private worth and amiable character, his parents, and those who knew him, have deeply to deplore an affectionate son and an obliging friend.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

December 21st, 1842.—Professor Lindley, President, in the Chair.

At the meeting of this Society, a paper was read from the Rev. J. B. READE, entitled Microscopic Chemistry, No. 1, On the existence of Ammonia in Gum, Sugar, and other "non-azotized bodies." The author, after alluding to the great degree of importance which chemistry might derive from the use of the microscope, goes on to state that a quantity of nitrogen not exceeding the $\frac{1}{10000}$ th part of a grain if existing as a constituent of ammonia, may be detected with certainty by means of this instrument. The reason why Chemists have generally failed in detecting nitrogen in sugar, is because the quantity is too minute to be detected by the usual process of ultimate analysis; the method of detecting the ammonia in sugar was as follows—by burning the sugar in the spirit lamp until flame and aqueous vapour have ceased, and receiving the gas during subsequent combustion upon a slip of glass moistened with hydro-chloric acid. In conclusion, the Author stated that he had detected ammonia in Beer, Gum, and Suet, which had all been classified by Liebig as non-nitrogenized bodies. A second paper was read by H. H. WHITE, Esq., of Clapham, on a new species of *Xanthidium* found in flint which he had named *Xanthidium Tubiferum aculeatum*, and was characterised by having the tentacula, which were twelve in number, quite pointed and free from any appendages whatever, it measured $\frac{1}{160}$ th of an inch from the extremities of the opposite tentacula, and the specimen was afterwards exhibited to the Society. Arthur Hill Hassall, Esq., then read a paper entitled, 'Observations on the production of Decay in Fruit, by means of Fungi,' continued. The Author, after stating that in order to set aside any doubt which might exist of the power of fungi in producing decay in fruit, he had inoculated sound fruit whilst on the tree, and found that the decay was as rapid as in those specimens which had been previously removed from the tree. He contended that the mere bruising of fruit was not sufficient to cause decay, but that the presence either of fungi, or of the sporules of fungi were necessary before the decay could take place.

ON THE PRESENCE, IN THE NORTHERN SEAS, OF INFUSORIAL ANIMALS
ANALOGOUS TO THOSE OCCURRING IN A FOSSIL STATE AT RICHMOND,
IN VIRGINIA.*

*By John Quekett, Student of Anatomy, Royal College of Surgeons,
London.*

THE attention which microscopic observers have bestowed on the examination of the components of the different strata of the crust of our globe, has brought to light some most curious and beautiful forms of animal life, the existence of which in a fossil state could hardly, a priori, have been expected. The labours of Professor Ehrenberg in this department of science have been attended with unprecedented success. He informs us, that he has discovered in the tertiary deposit of Eger in Bohemia, a stratum two miles long and twenty-eight feet thick, composed entirely of fossil animalcules and fossil pollen, the first ten feet being animalcules, the remaining eighteen, animalcules and pollen. More recently, the researches of Professor Rogers of Richmond, in America, have disclosed to us the existence of microscopic animals in an older stratum than any before known. The layer is of great extent, and twenty feet thick, and separates the eocene and miocene tertiary beds, and the city of Richmond itself is built upon it. It contains animals, for the most part different from any before seen, and amongst them are many new kinds of *Naviculæ*, *Actinocykli*, *Gaillionellæ*, &c., &c.; but the most remarkable form is a circular disc, covered with hexagonal spots or spaces, disposed in curves so as to produce an effect something like the curves on the back of an engine-turned watch. Most of the Members of the Society must now be familiar with these beautiful animals, as, through the kindness of Professor Bailey of West Point, New York, my brother, Mr. Edwin Quekett, and others in this metropolis, have received portions of this stratum for examination. The discs above mentioned vary much in diameter; some are as small as $\frac{1}{1000}$ th of an inch, whilst a specimen in the possession of my friend Mr. Jackson, is exactly $\frac{1}{100}$ th of an inch. Fragments of these large discs very often occur; but Mr. Jackson's is the finest perfect specimen, I believe, that has yet been seen by any English microscopist. With a high power, these discs are found to be curved, and are in shape like a watch-glass,

* Read before the Microscopical Society, January 26th, 1842.

being surrounded with a raised margin. The centre of some of them is very remarkable, being composed of five hexagons larger than those on the circumference, which are arranged in the form of a rosette;* in others the hexagons gradually decrease in size, from the circumference to the centre, so that the central hexagons are the smallest. In the large specimens, the hexagonal light parts appear as perforations, and they resemble very much the eyes of some insects; they must certainly be covered with a transparent substance, if we judge from the effects produced by light upon them; for they act as so many lenses, and the image of an opaque body placed in front of them is well seen in every hexagon. In the smaller specimens, the reticulated appearance is nearly lost, and they then present a dotted surface; there are some specimens which are very minute, and of a pink colour†, which are interesting from the fact of their being so readily identified with recent specimens, even to their shade of colour. They are not very abundant, either in the recent or fossil state; but they can be easily distinguished from the fragments of *Gaillionella*, which they very much resemble, both by their colour and the absence of furrowed margins. In a specimen of the sand which I possess, mounted in Canada balsam, there are several of these little discs, and I have no doubt that many other persons are perfectly familiar with them, although, from their minuteness, in some cases they may have been overlooked.

Beside the engine-turned discs, there are other very beautiful forms; of these the *Giallionella* are very remarkable; they are most like the *G. sulcata* of Ehrenberg; they often occur in columns, of thirty or more in a column; but numerous fragments or joints may be seen separate, showing to a great advantage their margins, which are furrowed, and are like the milled edge of a piece of money. When examined in the column, the spaces between the furrowed edges appear transparent, as if there were nothing contained between them. Several species of *Actinocyclus* also occur, having six or more rays in each valve, as seen with a high power; every other space between the rays is found to be in a different plane to the others; they are often met with in pairs, so that by adjusting the focus, both sets of rays may be brought into view in succession, and when viewed edgeways, they resemble small flat boxes. Besides these, there are numerous species of *Navicula*, *Bacillaria*, &c., &c.; and a remarkable species of *Navicula*, which has attracted the attention of several observers, is one, whose sides are

* *Coscinodiscus Oculus Iridis*.—Ehren.

† *Coscinodiscus minor*.—Ehren.

indented like that of the body of a fiddle (panduri-form.) This, when once seen, cannot well be mistaken for any other species. A curious and very remarkable animalcule, composed of two oval convex valves, with markings or dots on both valves (not unlike those on the engine-turned discs), is to be now and then met with; it appears to belong to the genus *Pyxidicula* of Ehrenberg (fig. 1). It is of such a curious shape, that when once seen it cannot easily be forgotten; it is not unlike an egg divided transversely, and can be easily recognized in the recent state. The other forms are far too numerous to be comprehended in the present paper, the object of which is merely to point out the similarity betwixt these Infusoria and those at present existing in the Northern Seas.

During the past summer, having had occasion to add fresh spirit to some Zoophytes contained in bottles, which had been collected in the neighbourhood of Melville Island, and were brought home by the Northern Expedition in 1822, under Captain, now Sir Edward Parry, and presented to the Royal College of Surgeons, I collected on a filter the deposit in the bottom of the bottle, which had been washed from them by the spirit; and on examination subsequently by the microscope, the first thing that attracted my attention was a Gaillionella, precisely similar to the Richmond specimen. This led me to inquire whether the circular engine-turned discs, or any other of the forms characteristic of the Richmond stratum were present with them. In a short time I succeeded in finding several specimens; the engine-turned discs were for the most part smaller than those in the Richmond sand, but in other respects nearly identical. The margins of one species, in particular, were very beautiful, being much raised, and having in some specimens a row of tubercles or dots around them. There was no appearance of perforation: their surfaces presented rather a dotted appearance (fig. 13), like some of the small fossil specimens; in some the dots were arranged in a linear series, but in others in the form of radii. I also detected a few of the large species, but they are rare compared with the small ones above alluded to; but fragments of them very often occur, which clearly prove that these also were present with the smaller specimens, as in the Richmond sand*.

Besides these beautifully marked specimens, there were other circular margined convex discs (fig. 16), sometimes occurring singly, but

* These discs appear to differ from the fossils, in being found in pairs, as if they were bivalves. I have only in one instance met with two of the fossil discs in close proximity to each other.

mostly in pairs. When they are found single, their surfaces are quite free from any marking; but when in pairs, they present a granular appearance, which is derived from granules, probably ovaries, contained between their valves. At first sight it might be imagined, that they were marked discs; but on a careful examination of numerous specimens, these granules will be seen to vary in their position; in some, they occupy the whole of the surface of the disc; in others, the granules will be fewer in number, and will be drawn into a small compass, leaving the other parts of the disc quite free from any trace-marking; proving, that the granular appearance of the surface is dependent upon what is contained between the valves. These discs are exceedingly common; they are about the $\frac{1}{150}$ th of an inch in diameter. There is another kind of discoid animalcule, much smaller than the preceding; but in other respects precisely like it, which is on an average $\frac{1}{400}$ th of an inch in diameter, and contains granular matter between its valves. Numbers of this small species may be observed attached in clusters, with now and then some large ones amongst them, to minute portions of algæ (fig. 15). Both kinds are provided with a slender stalk or pedicel, by which they adhere to the edge of the alga; they are never seen in columns as *Gaillionella*, but may be observed connected together like bivalve shells (fig. 15). Animals something like these may now and then be observed in the Richmond fossil, but I cannot say that they are identical with them. From the circumstance of both the large and small specimens preserving a tolerably uniform size, I imagine that they may be distinct species, as it is rare to meet with any of a size intermediate between the two.

The *Gaillionellæ* (fig. 2), if anything, are generally rather larger than those in the fossil state; they are the true *G. sulcata* of Ehrenberg, and occur in long columns of thirty or more in a column, and furrowed at intervals; and where the Richmond specimens are transparent, these appear to contain animal matter; in the markings on their edges and other peculiarities, they are precisely alike; and as in the fossil specimens many occur in separate pieces, which exhibit the beautiful furrowed margin, which is combined in some instances with two concentric circles, one plain, and the other showing the furrowed edges with lines radiating towards the centre. The specimens of *Navicula* are remarkable both for their beauty and the number of the species which occur in so small a space; in four mounted preparations, there are as many species as eight, and five of these are precisely analogous to those in the state fossil; and there is one remarkable specimen which has been before noticed, and one which Professor Bailey, in a letter to my bro-

ther, has pointed out in the Richmond fossil, which occurs often amongst the recent one; it is in shape what the botanist would call panduriform or fiddle-shaped, and has been before alluded to (fig. 5). Another very remarkable specimen, is one which is broad in the middle, and tapers gradually to each extremity, and also peculiar on account of the boldness of its markings; this also found in both the recent and fossil state (fig. 8).

A beautiful specimen (fig. 6), which is like the *Navicula viridis* of Ehrenberg, is very common. Another *Navicula*, of rather a large size, with dots instead of lines on each side (fig. 14), is frequently met with; but I have not yet observed a specimen of this kind in the Richmond stratum.

Besides these, a species of *Bacillaria* (fig. 9), and several kinds of *Fragillaria*, one of which, the most common, is represented at fig. 10, also occur in tolerable abundance.

Some curious forms,* very much resembling *Naviculæ*, are now and then to be met with; one of these is depicted at fig. 11, and a species quite distinct from the last, is very common (fig. 12). It consists of a shaft or body, indented at both ends, and surrounded with a zone or belt, which occupies two-thirds of the shaft. With a power of 200 linear it appears quite transparent and free from any trace of marking; but, with a power of 500, both extremities are found to be covered with dots, and the zone surrounding the shaft is marked with very fine lines, which require an object-glass of good defining powers and nicety of adjustment to exhibit them. I have been informed, that similar specimens have been seen in the Richmond sand, but I have met with none as yet.

Another very common thing which has been observed, is a tri-radiate spiculum of sponge. This occurs in very great abundance, and is to be met with also in the fossil state (fig. 13). In fact, what has by the action of spirit been washed from these Zoophytes, is equally abundant in different kinds of animalcules as the Richmond sand.

Having said thus much on the occurrence of these beautiful circular discs, both in the recent and fossil state, it might now be asked, What is their nature, and to what class of the animal kingdom are they to be referred? In the present state of our knowledge concerning them, these are difficult problems to be solved; but analogy would lead us to imagine that they are bivalve Infusoria, at least the specimens of unmarked discs which have been previously mentioned certainly are; for

* *Triceratium Striolatum*.—Ehrenberg Op-cit.

in many cases the two valves can be seen opened to a certain extent, and granular matter found to be contained between them. These discs are precisely similar to the engine-turned discs, with the single exception of being deficient in the hexagonal spots. Another fact which would lead one to the same conclusion has luckily been observed. Amongst the animalcules, portions of sea-weed have been noticed, which have numbers of the small discs last spoken of, and now and then a large one adherent to them, they occur in clusters ; and from the irregularity of their position, they present a variety of shapes to the observer, so that their true nature can be made out, and they are found to be connected to the weed by a slender stalk or pedicel like a polype. In the detached specimens, this pedicel is not often seen ; when it is, it will be found that in some specimens the stalk is contracted like that of the bell polype, but not in so distinct a spiral. As no other difference is to be seen between these specimens and the engine-turned discs, except that of their wanting the reticulations, we are led to believe that they also might have been composed originally of two valves.*

There are some important points connected with these animalcules, worthy of attentive consideration.

We have before us the fact of the existence in the Northern Seas at the present day, of minute Infusorial animals, many of which are precisely similar to those which have lived not only in a much lower latitude, but have become extinct probably some hundreds of years ago ; and the most extraordinary circumstance connected with this subject is, that in so small a space, and in a mass of matter much less in weight than the $\frac{1}{100}$ th of a grain, washed from a few solitary Zoophytes, so great a variety of organized beings should be collected together ; and that in an equal weight of the sand from Richmond in America, more than twelve distinct species of animals should be found common to the two. So characteristic are the skeletons of the different races, I may say species, of animals that populate the earth, that the comparative anatomist, from seeing a single bone, can inform us to what class of animals such a bone belonged ; but in the case before us, we have an additional aid in the microscope, an invaluable instrument, by which not only identity of structure, but the slightest variation in the form and dimensions of animals invisible to the naked eye, can be accurately measured.

* Since the above was written, I have been fortunate enough to meet with a specimen of the engine-turned discs, with both valves together, so that no doubt can now exist of their true nature.

Since the reading of the foregoing paper at the Microscopical Society, in January, 1842, a communication of Ehrenberg's, in the Berlin Transactions, entitled, "Uber noch jetzt zahlreich lebende, Thierarten der Kreidebildung und den Organismus der Polythalamien," and three papers by Professor Bailey of West Point, New York, entitled, "American Bacillaria," have reached this country. Both of these communications are exceedingly interesting and valuable, especially that of Ehrenberg, as my observations agree with his in having discovered the engine-turned discs in the recent state. He gives figures of some of the most interesting species, and of many other kinds of Infusoria, which can be recognised both in the Richmond sand and in the waters of the Arctic Sea. Ehrenberg's specimens were obtained either alive at Cuxhaven, or in the fossil state in the schists of Oran, Cultasinetta and Zante, localities widely different, as to climate, to that of Melville Island in the Arctic Sea. He gives the name of *Coscinodiscus* (*sieve-like discs*), to the beautifully marked specimens, and describes as many as seven species, including both the living and fossil. Professor Bailey also gives beautiful figures of some of the more remarkable forms occurring in the Richmond stratum; but his beautiful figure, to which he has affixed the name of *Coscinodiscus radiatus*, cannot be the same as the *C. radiatus* of Ehrenberg, as in Ehrenberg's figure, the hexagons in the centre are equal in size to those at the circumference; whereas the *C. radiatus* of Bailey has them gradually decreasing in size from the circumference to the centre. The *radiatus* of Bailey corresponds to the description of the *C. eccentricus* of Ehrenberg. Some of the specimens of *Coscinodisci* which occur in the water at the North Pole, are certainly different from any of those described either by Ehrenberg or Bailey; they are remarkable for the beauty of their margins, which are much broader than in any of the fossil specimens, and present a dotted appearance. The unmarked discs, both of the large and small kinds, as well as many of the *Naviculæ*, which I have described as occurring in the Arctic Seas, are not mentioned by either of the authors above named. Probably they were not to be found with the recent or fossil specimens, either at Cuxhaven or in the schists of Oran. I shall therefore take an early opportunity of making drawings of all the different forms which occur, for the sake of comparison with those noticed by other labourers in this interesting branch of microscopic investigation. I cannot, however, conclude this notice without bearing testimony to the accuracy of the beautiful figures given by Professor Bailey in his three papers above alluded to; and I am sure that many English microscopists will long remember his kindness in having transmitted to this

country, so interesting and valuable an acquisition to their cabinets as the Richmond sand.—*Dec. 28th, 1842.*

EXPLANATION OF THE PLATE.

- No. 1. Pyxidicula ?
2. Gallionella Sulcata.
3. Coscinodiscus lineatus.
4. ————— Patina.
5. Navicula ——— ?
- 6 ——— Viridis.
7. ——— ——— ?
8. ——— ——— ?
9. Bacillaria Tabellaris.
10. Fragillaria Pectinalis.
11. Triceratium Striolatum.
12. ——— ——— ?
13. Spicula of Sponge.
14. Navicula ——— ?
15. Small discs ? attached to a portion of Alga.
- 16 Large discs with granular matter.

Extracts and Abstracts from Foreign Journals.

[From the *Annales des Sciences Naturelles*, July and August, 1842.]

M. Quatrefrages on the Muscular Structure of Edwardsiæ, a new Genus in the Family of the Actiniæ.—The minute size and little thickness of the elementary muscular fibres, allowed the phenomena attending their contraction, to be repeatedly observed. The observations were readily made by employing a compressor. By the aid of this instrument it was easily seen, that in a muscle which appeared to contract in totality, all the fibres were far from being engaged in the effort, and that even several elementary fasciculi frequently remained inactive. These latter were easily distinguished by their zigzag flexures, which were caused in consequence of the shortening of the neighbouring fasciculi, and by the absence of transverse striæ on the fibres composing them. In proportion to the diminution of contractibility in a muscle, the number of fibres concurring to produce its movements diminishes also; but those which continue to contract, appear to do it with as much vigour as before. From this it may be concluded, that in muscular contraction the effect produced depends chiefly upon the number of fibres which enter into action, and that the muscular power is lessened, and finally extinguished, not so much on account of any diminution of contractibility in all their fibres, but because the number of those which really act becomes less and less. It may be said, that each elementary fibre enjoys a special

and independent life; and that, far from constituting a whole, in this respect they die one after another.

Another fact, which the author was able to verify many times, is, that the contraction is not exerted through the whole length of an elementary fibre at once, but that in one of even inconsiderable length, spaces of alternate contraction and relaxation are often seen.

Thus, in fragments of half a millimetre in length, the extremities might be seen in a state of contraction, in which the central part did not participate at all. Under other circumstances, however, the middle would contract, and the extremities remain in a state of relaxation. The appearance of transverse striæ,* and the increased diameter of the contracted portions allowed these different phenomena to be readily observed.

While M. Quatrefrages was making these observations in the Island of Chausey, upon animals placed at the bottom of the zoological scale, Mr. Bowman communicated to the Academy analogous facts, ascertained by him in higher animals, facts of which M. Quatrefrages says, that he could have had no knowledge till his return to Paris. This accordance in the results obtained by two observers, unacquainted with each other, and placed in circumstances so different, appears to warrant great confidence in their exactitude. Another consequence which may be derived from this accordance, is, that we find in it a new proof of the simplicity and of the unity of the physiological laws which regulate organized beings, however remote they may appear to be in other respects, by morphological modifications of their organism.

Mandl on the Use of the Microscope in Medico-Legal Researches. (Continued from page 248.)—*Means of distinguishing Blood from all other substances.*—Since the researches of M. Orfila, the mode of distinguishing blood from every other substance, is well known to medical jurists, but it may be useful to say a few words on this subject. To ascertain the nature of a suspected stain, we macerate it in cold distilled water, taking care to leave a certain space between the stain and the bottom of the vessel. If it be a blood-stain, we soon see a number of red streaks, which descend and redden the lower portion of the fluid; the tissue on which the stain exists loses at the same time its colour, and presents the appearance of a thin greyish layer, or of white, or whitish-red filaments. This is formed by the fibrine and insoluble portion of the blood-globules; the red streaks are formed by the colour-

* It is rather curious, that the transverse striæ should have become visible only when the muscular fibrilla was in a state of contraction, and should not be present when it was relaxed, in which state they are generally much more readily distinguished. With reference to this it may be observed, that no transverse striæ are observable in the longitudinal muscular bands in the nematoid entozoa; as, for instance, in the different filariæ, in which, especially, they form two very distinct and strong lateral bands, in which the occurrence, however, of straight and zigzag fasciculi are constantly to be seen.

ing matter of the blood, which has been discharged by the action of the water.

We have thus two parts essentially distinct, the macerating fluid and the filaments. The fluid becomes lightly red when stirred up with a glass tube; when gradually heated to near the boiling point, it becomes turbid, suddenly changes its colour, and deposits flocks of coagulated albumen, or becomes opaque. If flocks are deposited, they are of a grey-green colour, and without the slightest tinge of red, the supernatant fluid being colourless, or of a yellow-green tint. If the fluid be filtered and treated with potass, it assumes a green tint with reflected light, and a rosy tint with refracted light. If, on the other hand, the fluid be not filtered, and potass is added, the same result is obtained. Now, there is no colouring substance in union with animal matter which produces similar phenomena. As for the filaments, they are soft, slightly elastic, and soluble in potass; and the latter solution, treated with chlorine and a little hydrochloric acid, throws down flocci of coagulated animal matter.

By these characters, and others which we need not enumerate, the chemist can always distinguish blood-stains from all other spots, (those of citrate of iron, for example, rust, &c.). M. Raspail, however, is of a contrary opinion, and says, "that if you leave a bag filled with madder for two or three hours in the white of egg, and then dry it at a temperature of 25° to 30° C., a red stain is obtained exactly similar to a blood-spot." But M. Orfila has completely refuted this objection, which might easily be decided by testing with lime. Hence, there is no doubt that the medical jurist can distinguish blood-stains from those produced by any other colouring substance.

Consideration of the means proposed to distinguish the different kinds of Blood from each other.—In reference to one of M. Orfila's memoirs, M. Dulong remarked, in 1827, "that one of the most characteristic marks of a blood-stain, even when old, is the form of the globules when examined under the microscope; with this instrument we can distinguish the blood of different classes of animals. The globules of dried blood of the mammalia present a white disc, surrounded by a red circle, while in birds the white disc is surrounded by an elliptical globule." M. Orfila lost no time in verifying the assertions of M. Dulong, but his researches were not favourable to the use of the microscope. It results from the experiments of M. Orfila, "1. That, even admitting the blood to contain a number of characteristic globules, it is sometimes impossible to discover these globules in blood dried for any length of time on a piece of glass; and still more so when the blood lies on a piece of cloth, &c. 2. That although the globules of mammalia may be circular, and those of birds and cold-blooded animals elliptical, yet when we examine dried blood from a piece of linen, we find elliptical globules in the blood of mammalia, and round or triangular globules in the blood of birds; this probably depends on the mixture of some foreign particles with the globules." The opinion formed by M. Orfila was derived from his imperfect method of examination, and since his experiments no others have been made for the elucidation of this subject, at least with the microscope.

M. Barruel, however, attempted to resolve the question by chemical

means. On mixing sulphuric acid with blood, he pretended that he could distinguish by the smell alone the blood of different animals, and even the blood of the male from that of the female. But although the experiments of M. Barruel were fully confirmed by several other medical men, we must acknowledge that the sense of smell is too uncertain and fallacious a test to be applied to questions of medical jurisprudence; besides, for the experiment of M. Barruel, a considerable quantity of blood is necessary, a circumstance which rarely occurs when the opinion of a medical jurist is required. Hence, it results that we are not acquainted with any means of distinguishing the different kinds of blood from each other.

Mode of distinguishing the Blood of Man and Mammalia from the Blood of Oviparous Animals.—When the medical jurist has decided that a spot examined by him is formed of dried blood, his task is not finished. The accused person may pretend that the stain was produced by the blood of a fish, a bird, or any other animal. I have just shown that we possess no means of distinguishing the blood of different species of mammiferous animals from each other, but my experiments enable me to affirm that we can distinguish the blood of this class of animals from the blood of birds, fishes, and reptiles. The following is the process which I adopt:—I have already mentioned, that when a blood-stain is macerated for some time in water, we obtain the fibrine in a separate state; it is to this mass that we must direct our attention. Having prepared a piece of glass, like that used in other microscopic researches, we place on it a drop of distilled water, and then, with the point of a needle, scrape off some particles from the stain; we should choose in preference the edges of the spot, because here the dried blood is thinnest. The particles thus scraped off will be four or five in number, and not larger than pins' heads. They are next placed carefully in the drop of water, and allowed to remain for some time, until the colouring matter is removed; this generally occurs in half an hour at most. When the colouring matter is dissolved, we must remove some of the water by inclining the glass plate so as to let it run off over the edge; we then take a second plate, and place it carefully over the drop of water, avoiding any degree of pressure; persons accustomed to microscopic observations will soon be able to ascertain the quantity of water necessary for any given experiment. We have now the particles, deprived of colour, and fixed between two plates of glass. The latter are placed under the field of the microscope. Our attention should be directed, at first, to the transparent edges, where we can examine the particles most readily. If the spots have been produced by the blood of a mammiferous animal, we now find an unorganized mass, enveloping some white globules; but if the blood be taken from an oviparous animal, we see a great number of oblong nuclei, closely applied to each other, in a coagulated mass of fibrine; the external edges of each globule are not visible. We thus distinguish easily the blood of a mammiferous from that of an oviparous animal; but the microscope does not enable us to distinguish the blood of man and other mammalia from each other, because the globules present no distinctive characters. The presence of hair, &c., may, however, furnish some useful information; thus we

can easily distinguish the hair of a rabbit, ox, &c., from human hair.—*Gazette Méd. de Paris, Sept. 3rd, 1842*; and *Prov. Med. and Surg. Journ., Sept. 10th, 1842*.

[From the *Comptes Rendus*, 1842.]

Payen on the Mineral Compounds found in the thickness of the Walls of Cells in Vegetables.—When the author submitted to the Academy his last researches relative to concretions in plants (*vide Micros. Journal, Vol. II, p. 212*), he showed that all the details of their organization were reproduced in a sort of skeleton. Silica almost solely marked the lineaments of the peripheric membranes, whilst carbonate of lime predominated in the situations where the combustion had destroyed cells situated beneath the epidermis, or still more deeply imbedded in the tissues of the plant; thus, then, the silica on the one part, and calcareous compounds on the other, had been interposed in the thickness of the membranes during the life of each plant.

But, among the different salts containing *organic acids*, which was that, or those, *whose residue upon decomposition was carbonate of lime*? Being then, unable to resolve this question in a way clear from all doubt, the author abstained from hypothesis; but now, having made some more successful attempts towards the solution of the problem, he hastens to communicate to the Academy two examples of the new results which he had obtained. They are sufficiently remarkable; the one by the clearness of the experiment, and of the organographical observations which it makes accessible to the microscope; and the other by the easy solution which it gives to certain questions, decided in contrary ways, after an interval of several years, by the labours of a learned analyst.

1. Remove with care the epidermis of a cactus (*Cereus Peruvianus*), no trace of crystals will be found in the cells of this epidermis; all the sub-jacent cells, containing compound coloured substances, are eliminated without difficulty. Then rolling up on itself this sort of tough membrane, it is cut with a razor into very thin strips, which are to be washed on a cloth, and freed from all soluble and pulverulent substances.

They are then to be strongly pressed, and put into nearly their volume of acetic acid (à 5 degrés); at the end of some hours, the acid is extracted by pressure, containing acetate of potass and lime, and also some pectine.

The residue is repeatedly washed with distilled water; inspection by the microscope now shows that a delicate layer has been removed in the thickness of the membranes of the cells, beneath the first epidermic layer.

The whole mass is then plunged into its volume of sulphuric acid, diluted with ten parts of water, and allowed to remain there for a day.

The turbid acid solution, which is then extracted by pressure, contains much sulphate of lime, a little pectine, and some sulphate of potass; it is to be exhausted by repeated washing.

After this second treatment, microscopical observation reveals no appreciable change.

This absence of change depends upon the fact, that the pectine, the lime, and the potass thus extracted, do not leave any sensible void, while a very bulky substance which accompanied them, remains behind; this is the pectic acid. This acid is readily extracted in its turn by dilute solution of ammonia. Under the microscope the re-action is very curious; it hollows out, as it were, the thick membranes, and shows their layers superimposed one upon another, renders apparent the lines of demarcation between the cells, which had previously been confused, and allows them to be distinguished, although the epidermic cuticle remains continuous, showing numerous cavities and linear projections, which are formed during vegetation, and which correspond to the intervals between the cells of the first superficial layer.

This microscopic observation can be rendered more evident by the gradual addition to the water, first of iodine, and then of sulphuric acid, which give an orange colour to the cuticle and other parts of the cellulose, containing an azotized substance, whilst they render of a beautiful violet all those laminae consisting of pure cellulose.

As for the pectate of ammonia extracted from all the substances treated, it may be purified by concentration *in vacuo* and precipitation by alcohol, &c.; and it may be converted into pectate of lime, or the pectic acid may be extracted from it: all these products are of a remarkable whiteness and purity.

Pectate of lime constitutes the greater part of the weight of the substances interposed in the epidermic laminae of the cactus; and united with pectinate of lime and of potass, it forms 0.55 of the total weight of the epidermis.

This enormous proportion has appeared to the author to vary according to the age of the portion of stem examined, and perhaps in relation to other circumstances.

2. The second fact which the author relates, came out upon the application of the proceeding above described to the tissues of the white beet; in this case, he succeeded in extracting in the same way, *directly and in the cold*, abundance of pectine and of pectic acid, which had been combined with lime, potass, and soda.

The question, then, of their pre-existence, which had hitherto appeared very doubtful, seemed to be decided in the affirmative.

It is well known in fact, that in his last memoir on the beet from which sugar is procured, M. Bracoanot supposed the pectine to be formed by the boiling, and hesitated very much in admitting the presence of pectic acid. These two proximate principles, such as they were obtained by M. Payen, necessarily approach the normal condition in which they occur in vegetables; for the combination of pectine with lime, had been apparently indecomposable by all chemical agents, without sustaining important alteration, whilst in reality we see that acetic acid is able to disengage it from vegetable membranes, and that dilute sulphuric acid removes even the last traces of it in the cold.

The comparative study of the products of the old and new method of extraction, would appear to offer some interest, especially when we

consider the curious isomeric transformations which M. Frémy has pointed out in his valuable work on pectine and pectic acid.

M. Payen considers that there is another calcareous compound contained in the walls of the cells of leaves; but the determination of its precise nature presents many difficulties, and if he should succeed in surmounting these difficulties, he proposes at some future time to communicate the results of his researches.

! [From *Schlechtenda's Linnæa*, 1842.]

Areschoug (J. E.) on the mode of Growth of Hydrodictyon utriculatum, (Roth).—The size of this plant differs much, at various periods of growth, from a line to an ell in length, though it rarely reaches this size; and the width, which at the most amounts to some inches, always bears the same proportion to the length. Its form is elongated and resembles a rounded bag, closed at both ends. This bag is formed entirely of a network, the meshes of which, in the highest stage of development, are some lines in diameter, and are for the most part furnished with five, though sometimes with four, six, seven, or eight, elongated cells, connected by their extremities.

The cells, which in consequence of their net-like arrangement are always joined together by their ends in threes, and are easily separated from each other, so that it is very difficult to find uninjured specimens, consist of a single (simple) membrane.

I have never been able to observe in this plant the enclosing tube, which occurs in *Confervæ*, discovered first by *Treviranus*,* and described afterwards by *Mohl*.†

These two circumstances, the easy separation of the cells and the absence of an enclosing tube, stand without doubt in near relation to each other. At least, it was this which allowed me to suppose that an individual *Hydrodictyon utric.* could not consist of a single *sporidium*,‡ without however wishing either to confirm or refute the opinion of *Mohl* as to the existence of an intercellular substance in general, or of what corresponds to it, the tube of *Confervæ* in particular.

In full grown specimens of this plant the cells, especially the internal ones, are lined with a green substance, not unlike that which occurs in other *Confervæ*. This substance is very thin, and, like the cell itself by which it is enclosed, is in the form of a sack or bag. The *sporidia* are imbedded in this substance, in greater or less number according to the age of the plant, and more or less apart from each other. Agreeably to this view we are desirous of shewing the mode of growth of the plant.

Vaucher§ alone, as it appears to me, has described the mode of growth of this Alga. It would seem from his observations, that in each cell

* *Beitrag zur Naturkunde von Weber und Mohr.*

† *Pflanzen, Substanz.*—*Tubingen*, 1836.

‡ *Treviranus.*—*Physiologie der Gewächse*, Tom. II, p. 619.

§ *Histoire des Conferves d'eau douce*, p. 82.

which forms one side of the neighbouring mesh, a little network is formed, which, floating freely out, is capable of attaining the size of the mother plant. But the manner and way in which this little network is formed, has remained, as I believe, quite unknown to him. In this respect also, later physiologists are in the same position.

In September, 1838, some specimens of this plant, taken from a pool of water near Gottenburg, were placed in a vessel full of water. I examined daily under the microscope portions of this vegetation, in order to observe every change; but the cells were always covered internally, partly with an already perfect minute network, and partly with the usual green matter. By continued observation I at last arrived at the conclusion, that the *sporidia* when ripe lay close together, and that then the green matter wherein the *sporidia* had been imbedded entirely disappeared, and was replaced by one consisting only of the *sporidia*. By alteration of the focus of the microscope, this green mass of *sporidia* could be brought into view on both sides, and the *sporidia* could be seen to commence an evident circular creeping motion, and to shew an increasing capability of movement. They afterwards became loosely divided from each other, and soon scattered about in the mother cell, constituting, as it were, a living swarm in it.

With respect to their motion, these *sporidia* differ materially from those of other *Confervæ*, since the motion of the former is more of a molecular kind, that is, they rotate themselves quickly backwards and forwards on their centre, without perceptibly changing their place; but on the contrary, the *sporidia* of *Confervæ* move with much quickness here and there across the field of the microscope, and describe in it longer or shorter circuits.

It is to be remarked also, here, that the *sporidia* of the *Hydrodictyon*, when in motion, are enclosed in the mother cell, whilst the self-moving *sporidia* of *Confervæ* are for the most part found external to it, and, moreover, those which are enclosed in a mother cell, move about from one end to the other, which is not the case in the *Hydrodictyon*. The motion of the *sporidia* in the *Hydrodictyon* is most lively at the commencement, when they first become separated from each other, and afterwards gradually decreases.

The form of the *sporidia* at the moment they become separate, is spherical, changing afterwards into elliptical. The decrease of the motion, and the change in the form of the *sporidia*, appear to stand in direct relation to each other; for the longer time the *sporidia* have been in motion, the more is their originally spherical form altered to the elliptic.

The *sporidia* are distinguished by a lighter colour at each end. In this respect, (since from this circumstance it would appear that the centre is occupied by a green substance,) there is also a difference to be remarked between those of the *Hydrodictyon* and those *Confervæ*; for in the latter there is only one light-coloured extremity, termed the *rostrum* by *J. G. Agardh*.

There appears to be no doubt, that the *sporidia* of *Confervæ* germinate in one direction through the *rostrum*, and that the *sporidia* of the *Hydrodictyon* do so in two directions, may not only be concluded from the two

light-coloured extremities, but is confirmed by what will be hereafter adduced. But whether this difference is to be regarded as the cause of the different kind of movement, is a question into which it would be only conjecture to enter. The cause of motion must then be sought in the influence exerted by the contained *sporidia* on the enclosing membrane; but how does this give rise to the motion? Probably, from an alternate contraction and expansion of the enclosing membrane induced by this influence. As has been said before, the motion of the *sporidia* is most lively at the commencement, and gradually decreases. After a short time they touch each other with their points, and present here and there the appearance of a mesh or small network; by and bye they all become united into such a mesh, and all motion ceases, the network lying complete, and enclosed within the mother cell. All this occurs within an hour.

This network begins to increase, the enclosing membrane becomes loose, and is finally altogether absorbed. That this takes place may be assumed, not only from the fact of the absorption of a mother cell, being a common phenomenon in physiology, but also from the circumstance that no trace of a rent or fissure through which the network could come out, is observable. At the time of the formation of the network, the *sporidia* are furnished with only a single nucleus; but as their age advances the number of enclosed nuclei is increased, until, as has been observed before, their maturity is announced by the conversion of the whole of the green matter into granules or *sporidia*.

With respect to the maturity of single cells great differences prevail; since in some cells the formation of the network may proceed with great rapidity, while the contiguous ones are very far from maturity. The difference in the time of different cells becoming mature, may amount to many days or even weeks.

Piorry on a Granular Appearance of the Buffy Coat of the Blood.—

In a recent lecture at the Hôpital de La Pitié, M. Piorry called the attention of his class to a granular condition of the buffy coat of the blood, which he has observed only in cases in which pus was contained in some organ in considerable quantity, especially in the lungs. In these cases, the buffy coat covering the blood contains rounded, greyish granulations, of a darker colour at the centre than at the circumference, varying from the size of a poppy to that of a hempseed. Sometimes five or six of these granulations are contained within the space of a square inch, at other times they are much more numerous. They are semi-transparent at their borders, opaque at their centre; they are situated at different depths in the substance of the buffy coat, from which they can be detached with the point of a scalpel, though not easily. The buffy coat does not present any other peculiar appearance, and these granular bodies have never been observed in the clot.

This appearance is far from common: M. Piorry has not met with it above twenty times. In seventeen or eighteen of these twenty cases, death took place; and in every instance pus was found in the substance

of some organ, especially of the lung, which, in fifteen cases, was in a state of purulent infiltration.

Pneumonia, with purulent infiltration of the lung, existed in the patient whose case gave rise to the above remarks. The granulations are regarded by Piorry as collections of purulent matter; and he replies to M. Donn , who denies their resemblance under the microscope, to the true pus-globule, that the circulation of pus in the blood must alter the characters of the former, and that the results of microscopic investigations are not of a value sufficient to overturn facts gathered by clinical observation.—*Gazette des H pitaux*. April 16, 1842, in *Brit. and For. Med. Rev.* Oct. 1842.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

January 18th, 1843.—*J. S. Bowerbank, Esq., F.R.S., in the Chair.*

A PAPER was read from that gentleman, "On the Structure of the Shells of Molluscos and Conchiferous Animals." The researches of the author into the structure of the organic tissue of the *Corallid *, published in the Philosophical Transactions, Part II, Vol. I, 1842, suggested to him the idea of pursuing a similar course of investigation into the nature and origin of the testaceous coverings of the *Mollusca* and *Conchifera*. He commenced his researches during the spring of 1842, and first carefully examined the young cartilaginous lips of the common garden snail, *Helix aspersa*, and subsequently the testaceous coverings of numerous species of adult univalve and bivalve shells. The general structure in the first kind was as follows:—The newly-formed lip was found to consist of a thin, yellow-coloured, horny substance with a number of minute globular vesicles (incipient cytoblasts and cells) in various stages of development, with a nucleus very visible in the greater number, by means of a power of 600 linear: these cells were most numerous on the inner side of the lip, or that in contact with the shell; the young cells were transparent, but in the neighbourhood of these, small patches congregated together, may be seen of a deep yellow colour, which appeared as the centres of ossification. Besides these, other cytoblasts occur, which are developed in the form of tessellated cellular structure, which ultimately form a minute vascular tissue, which is imbedded in bands, corresponding in their direction with the lines of growth of the shell; as these tissues approached maturity, the periostracum, advancing from the old lip, covers them, and binds the whole firmly together. The examination, by transmitted light of thin sections, made by the lapidary, of univalve shells, afforded but little information; but fractured surfaces, at right angles to the outer and inner planes of the shell, and either parallel or at right angles to the lines of growth by the lieberkuhn, exhibited three distinct strata, uniform in the nature of their structure, but alternating in the mode of their disposition, each stratum is formed of innumerable plates composed of elongated prismatic cellular structure, each plate consisting of a single series of cells parallel to each other. The structure of bivalve shells is rather more complicated than that of univalves; the

interior surface of some specimens exhibits a thin stratum of columnar basaltiform cells, at right-angles to the natural surfaces of the shell, whilst the upper is dense, uniform, and composed of numerous thin laminae, parallel to the natural planes of the shell; in other species, the inner surface, of about half the substance of the shell, is composed of numerous thin calcareous strata, whilst the outer half presents the appearance of numerous basaltiform columnar cells, having their planes at right-angles to the surface of the shell; several other differences of the arrangement of the cells in other genera were then given. The author went on to describe a minute vascular tissue, which embraced some of the elongated prismatic cells, and gave them a striated appearance; minute canals, corresponding to the Haversian canals of bone, only much more minute, were also frequently to be seen in some specimens. The author then alluded to the fact, that there must of necessity be some vascular connection between the animal and its shell, although he had at present failed in detecting any; and concluded by observing the mode of reparation of injured parts, which was found to be precisely similar to the formation of the new lip in *Helix aspersa*, as before described. Beautiful figures of the principal structures described, accompanied the communication.

Microscopical Memoranda.

THE new *marine glue* will be found an excellent cement for joining pieces of glass together, and especially in the making of cells for the reception of microscopic objects, mounted after the method of Mr. Goadby.

The glue is prepared in the following manner:—

Take 4 gallons coal naphtha, in which 1 pound caoutchouc is to be dissolved, by maceration for several days; and with 1 pint of this solution, 2 pounds shellac are to be mixed by heat; and when the fusion is complete, the material is to be poured out on a cold slate, and moulded into convenient forms for use. When cold, it is hard as sealing wax, and is applied by heating the pieces of glass, which, when hot, and covered with the cement, should be pressed closely together.

Report on the Results obtained by the use of the Microscope in the Study of Anatomy and Physiology. — Part I, by Mr. Paget. — Part II, by Dr. W. B. Carpenter. — British Foreign Medical Review 1—842—3.

THESE two reports afford a comprehensive view of the important results obtained by the use of the microscope in the above-named branches of science. The former of these, which has been published separately, is especially valuable to those interested in the subject, by the number and variety of its references to various writers, of old as well as recent date, and should be in the hands of all engaged in similar pursuits. The second part refers chiefly to the origin and function of cells, first in vegetables and then in animals, and gives an account of the more recent discoveries in embryology, nutrition, absorption, and secretion, to which the extended use of the microscope has so largely contributed, and which will have such an important connection with the progress of physiology.

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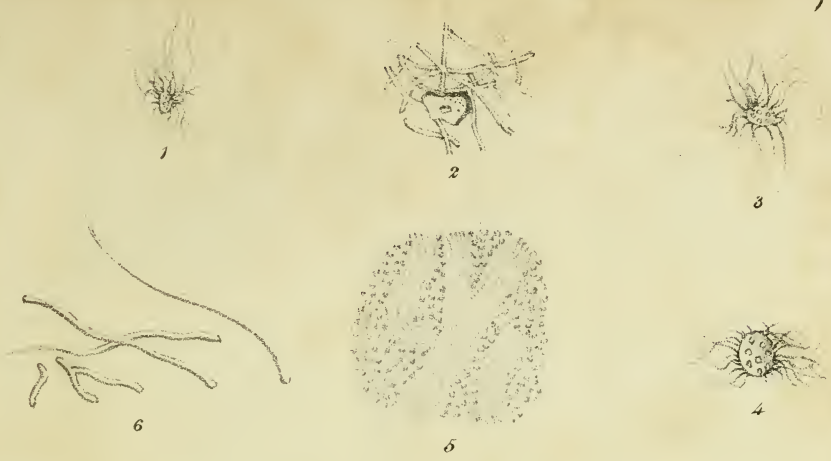
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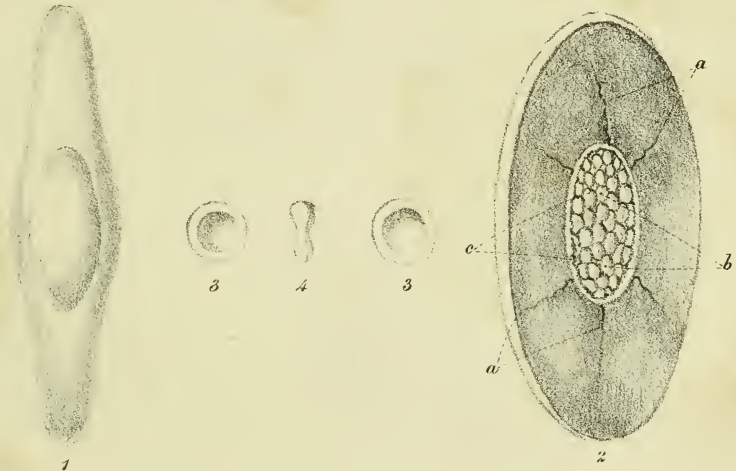
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New Substance on the Human Teeth.

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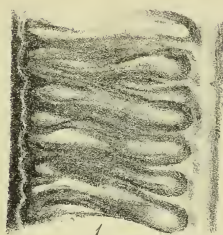


1. & 2. Blood Discs of *Siren lacertina*.
3. & 4. Do. Do. Man.

3



Anatomy of Pneumonia.



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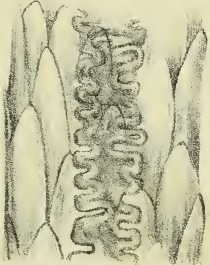
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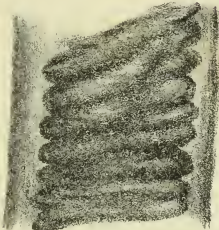
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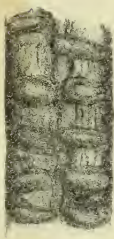
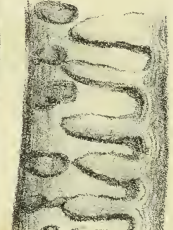
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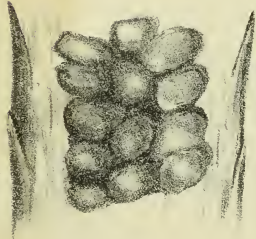
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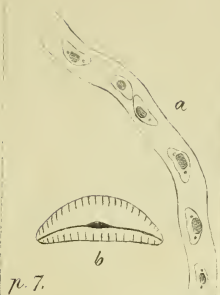


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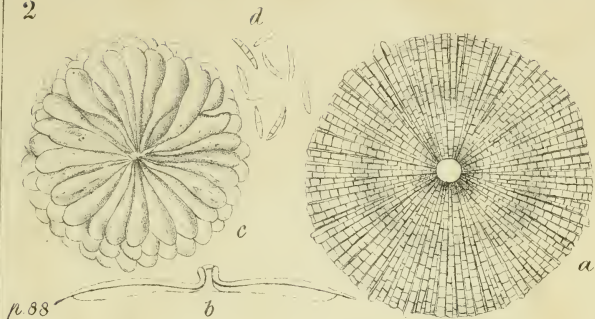
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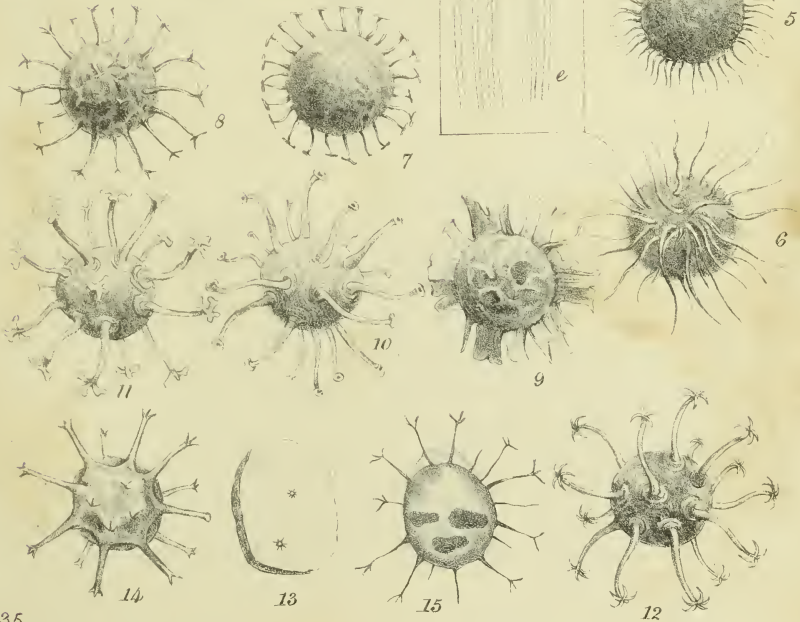
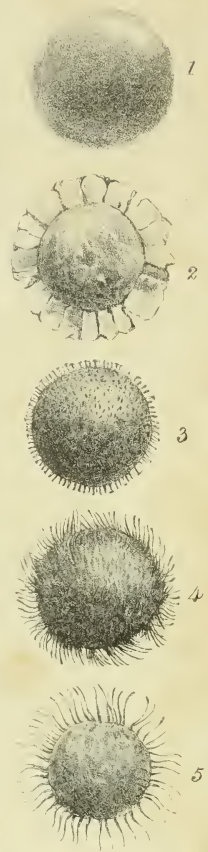


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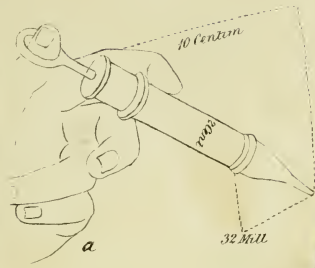
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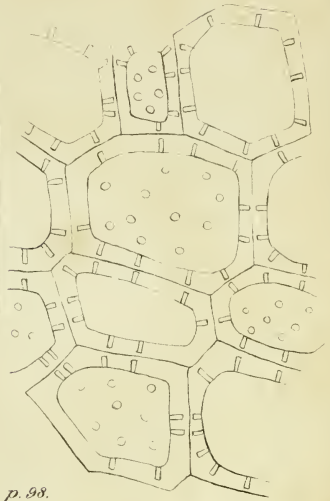
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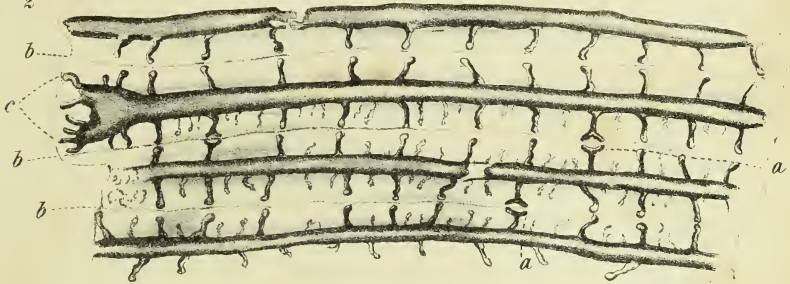
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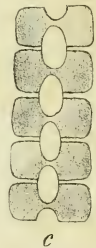
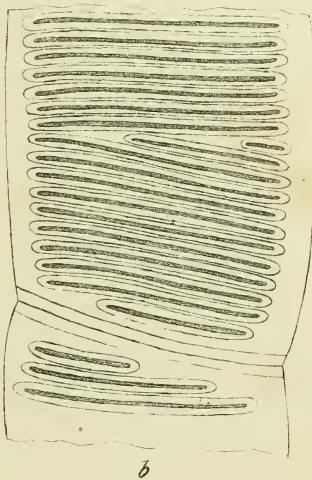
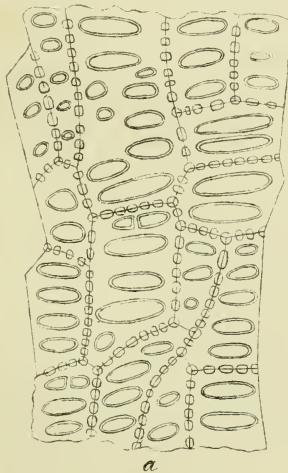


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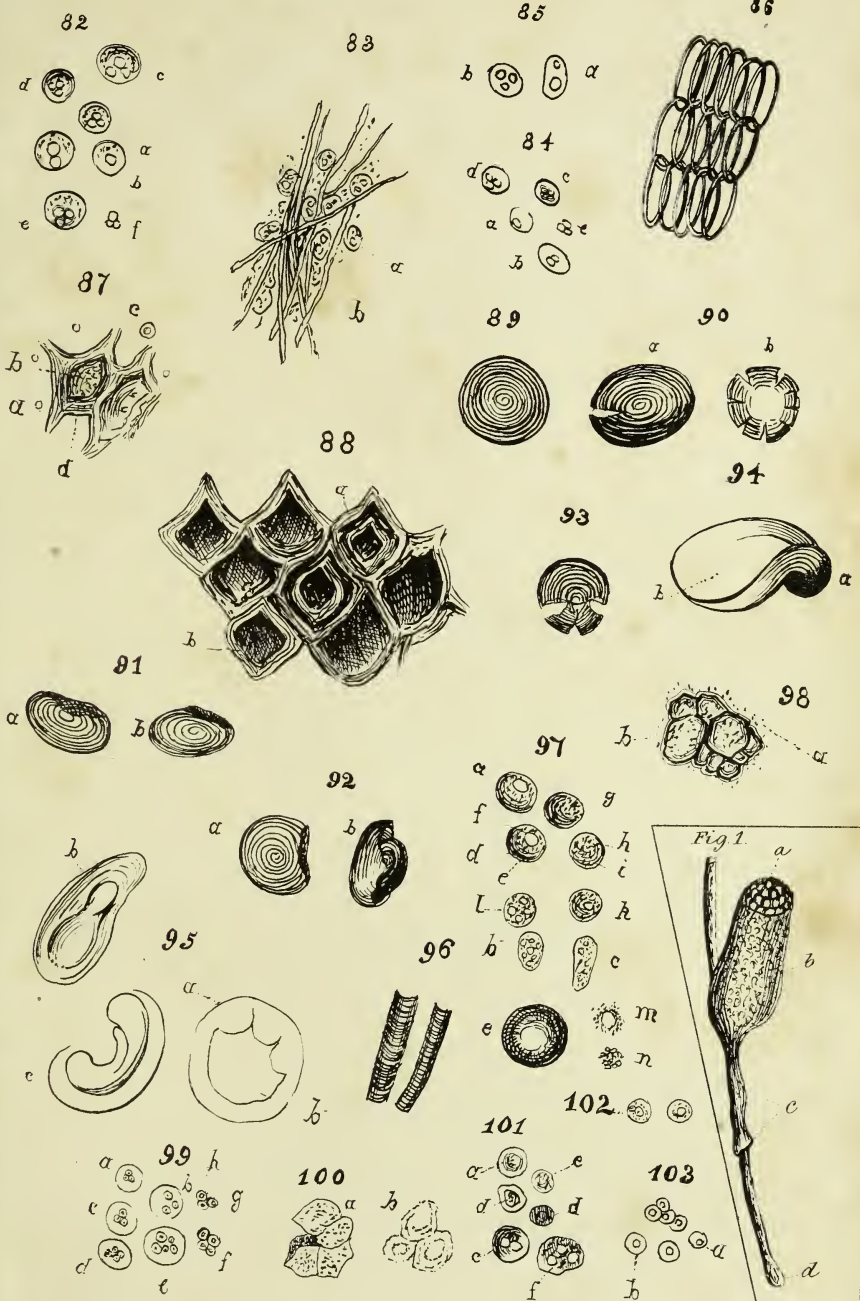


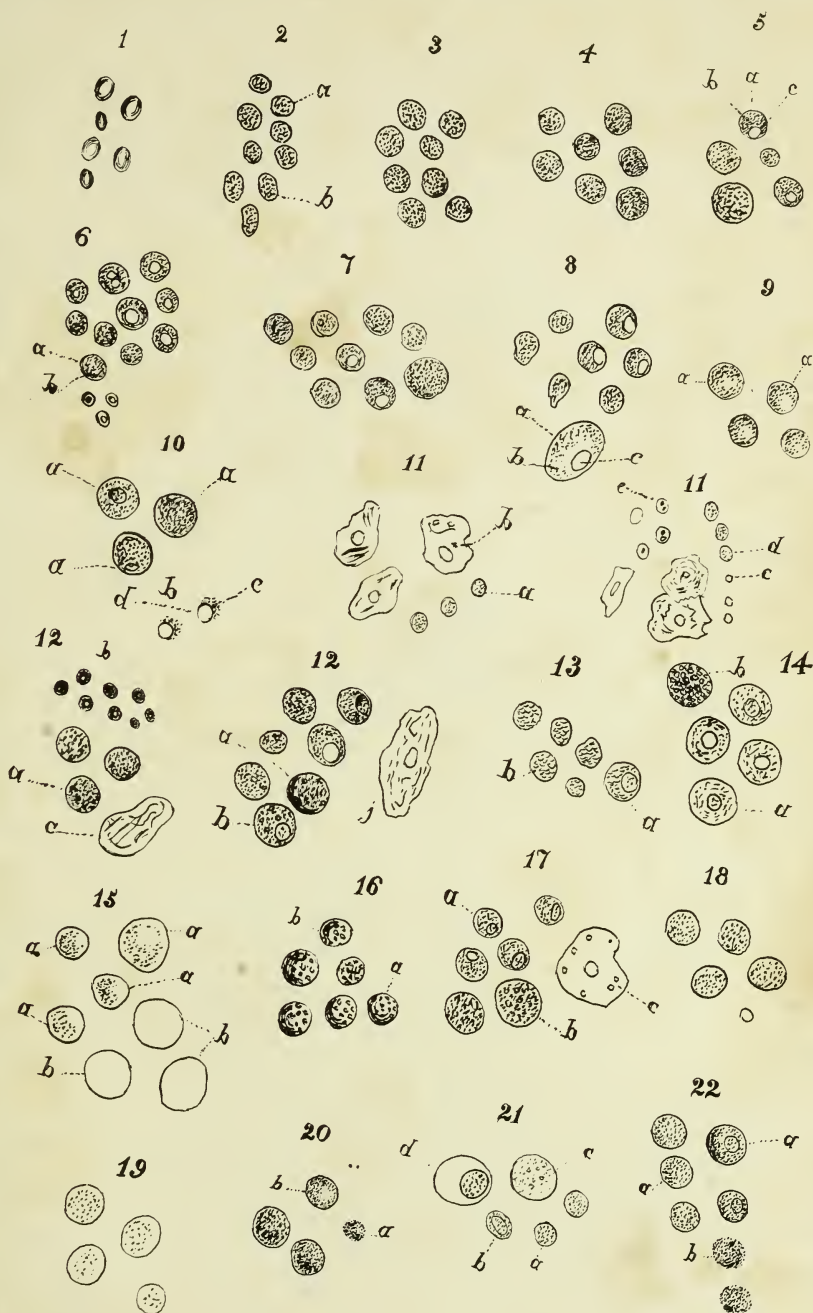
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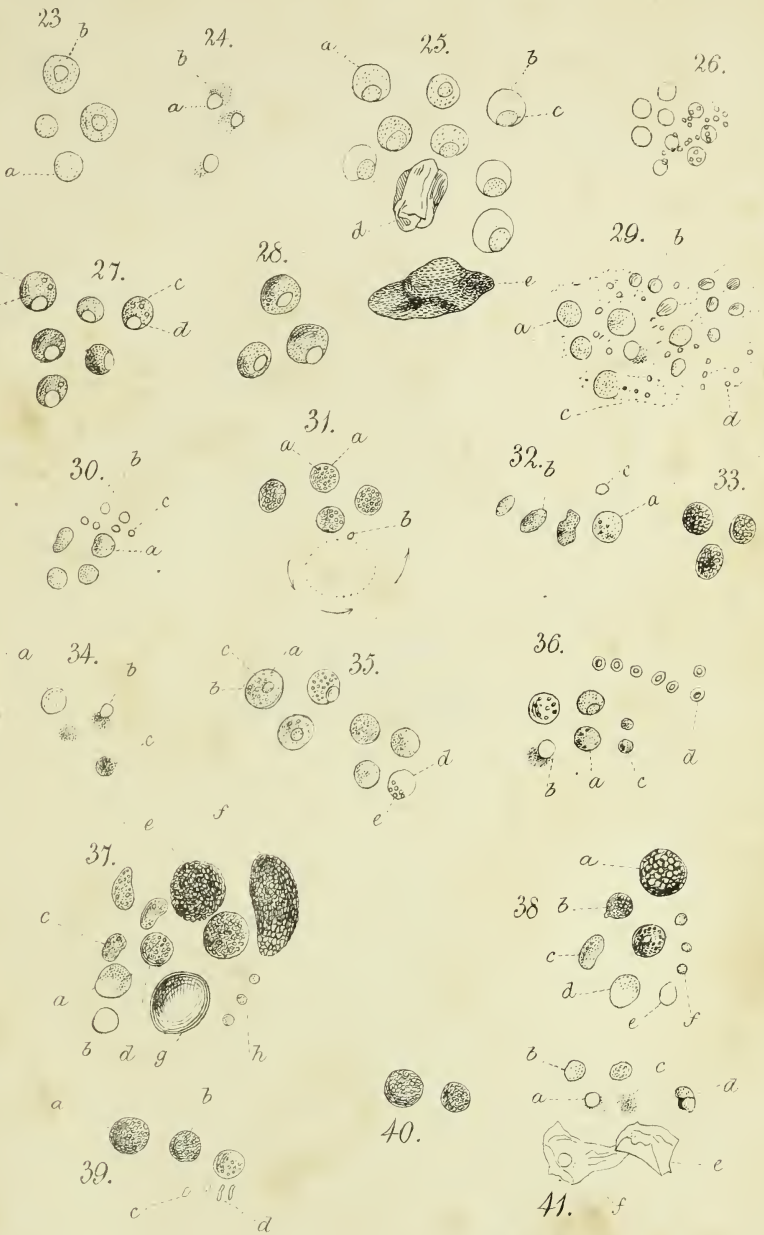
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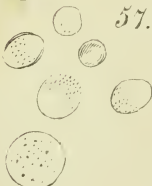
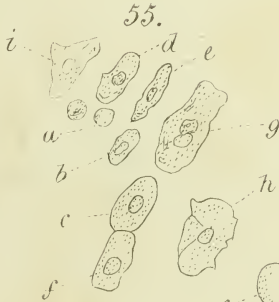
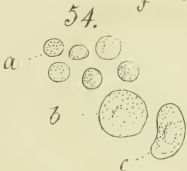
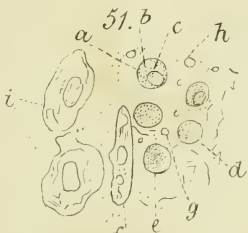
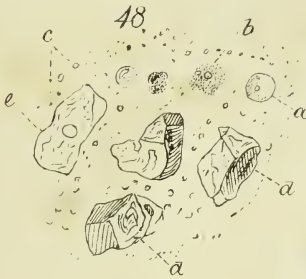
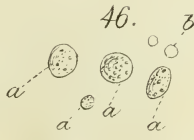
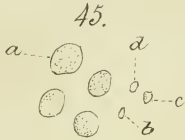
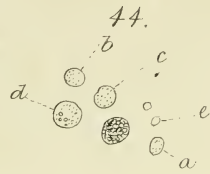
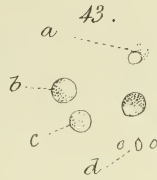
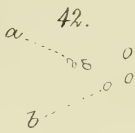


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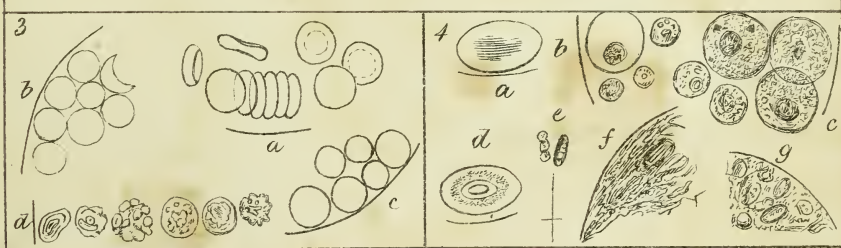
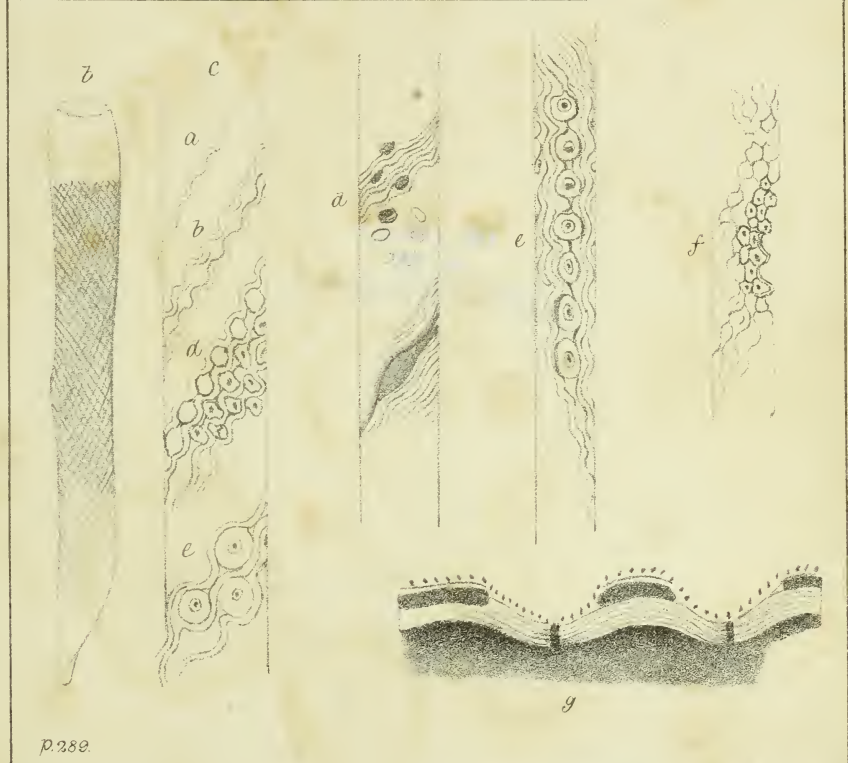




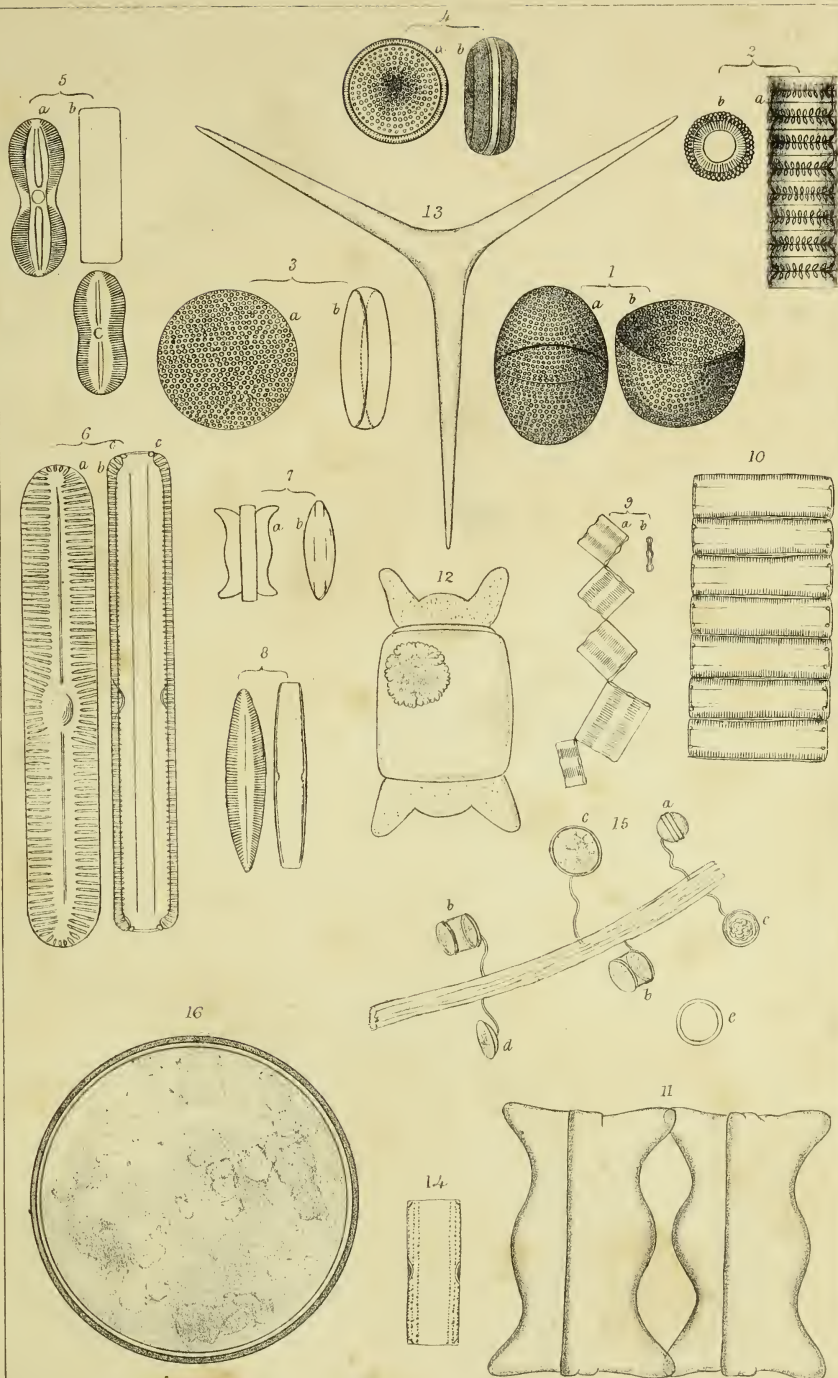
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